REHABILITATION NUMBER

STATE UNIVERSITY
APR 1954

the journal

of the association for physical and mental rehabilitation

CORRECTIVE THERAPY

MARCH-APRIL 1954 Vol. 8, No. 2

PRESTON

A Complete Line

FOR PHYSICAL MEDICINE AND REHABILITATION

REHABILITATION: **Progressive Resistance Exercise Units; Quadriceps - Gastrocnemius - Footdrop Boots;** Pulley Weights; Doorway Pulley Assemblies; various types of **Bicycle Exercisers; Restorator;** Kanavel Table; **Manuflex** and Grip Restorer for hand therapy; Ankle Exercisers; **Shoulder Wheels** with or without height adjustment; Stall Bars; **Walking Parallel Bars and Exercise Staircases** of various designs; Invalid Walkers; **Posture Training Mirrors,** single and triple; **Sayre's Headslings** and scales to measure amount of traction; Foldaway Jim, a gymnasium for the office or patient's home; **Gymnasium Mats** in various sizes, thicknesses and coverings; **Crutches and Canes;** Patient Lifter; **Patient Erector and Ambulator;** Self-help Devices **Cerebral Palsy Furniture;** Speech Therapy Equipment.

DIAGNOSTIC APPARATUS: **Chronaximeters;** Dynamometers; Goniometers; Oscillometers; Thermocouples and Skin Thermometers.

HYDROTHERAPY - ELECTROTHERAPY: **Whirlpools** for every use; Whirlpool Carriage; **Hubbard Tanks;** Paraffin Baths; **Hydrocollator** Master Units and Steam Packs; Shortwave Diathermy; **Galvanic-faradic-sinusoidal** Generators; **Hanovia Ultraviolet Lamps;** Heat Lamps and Bakers; Ultrasonic Generators; Treatment Tables; Timers.

New Items of Interest

Literature Upon Request

Walking Aid—A new walkerette with spring mechanism that makes the walker take steps along with the patient.....**$24.50**

Shoulder Wheel with Height Adjustment can be raised and lowered by as much as 20". Adjustable handle to vary arc of motion. Controlled resistance **$56.60**

WRITE FOR YOUR FREE COPY OF OUR NEW 1954 ILLUSTRATED CATALOG

ALL your needs supplied by ONE reliable source

J. A. PRESTON CORP.

175 FIFTH AVENUE, NEW YORK 10, N. Y.

It's a Thrill for them to drive again with the

HUGHES HAND DRIVING CONTROL

When you buy the Hughes Hand Driving Control you not only buy the **simplest, most efficient** and **economical** hand drivng control manufactured—you also buy one that has been **thoroughly tested by paraplegics under actual driving conditions.** No expense has been spared to make this the safest hand driving control possible. Paraplegics themselves have thoroughly tested the Hughes Hand Driving Control with thousands of actual driving miles in a single year.

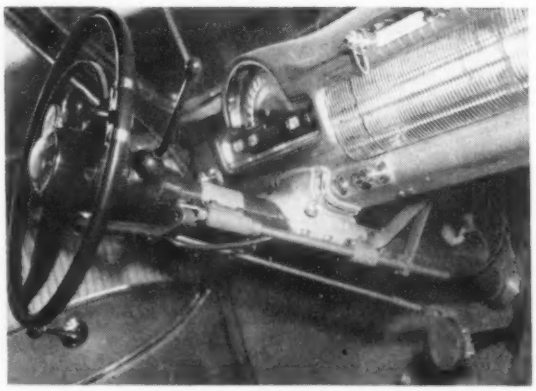
Write us direct for Prices and Literature

HUGHES HAND CONTROL AGENCY

Distributor

Tevis Bridge Road **Lexington, Missouri**

P. O. Box 204 **Clinton, Iowa**



Typical Installation of Hughes Hand Driving Control

Check these Features

√ Fits any automatic or semi-automatic transmission.

√ In no way precludes normal operation of car so equipped by non-handicapped person.

√ Easily transferred from one car to another by using conversion kit.

√ Only one control handle for gas, brake and dimmer switch.

MARCH-APRIL 1954

Volume 8 Number 2

Published Bimonthly
by the Association for
Physical and Mental Rehabilitation
Headquarters, 1472 Broadway, N. Y. 36, N. Y.
Telephone Bryant 9-9642

in this issue

EDITORIAL BOARD

Arthur Abramson, M.D. .....Bronx, N. Y.
Chief, P. M. R. Service, Bronx, V.A. Hospital
Frederick J. Balsam, M.D.....Memphis, Tenn.
Asst. Chief, P.M.R. Service, Kennedy V.A.-M.T.G Hospital
Thomas F. Barrett, M.D.....Chicago, Ill.
manager V.A. Research Hospital, 333 E. Huron St., Chicago 11, Illinois
John Eisele Davis, Sc.D.....Washington, D. C.
Chief, Corrective Therapy, P.M.R. Service
Edward D. Greenwood, M.D.....Topeka, Kansas
Consultant to Children's Division, Menninger Foundation
Arpad Pauncz, M.D.....Downey, Ill.
Chief, Professional Education, V.A. Hospital
Carl Haven Young, Ed.D.....Los Angeles, Cal.
Professor of Physical Education
University Southern California

EDITORIAL STAFF

EDITOR
Everett M. Sanders
1914 Poplar Avenue, Memphis, Tenn.

ASSOCIATE EDITORS
Paul B. Bell Stanley H. Wertz
James P. Callahan

CONTRIBUTING EDITORS
Max Houtchens, Ph.D., Washington, D. C.
Asst. Chief, Clinical Psychology Section, V.A.
Peter V. Karpovich, M.D., Springfield, Mass.
Professor of Physiology, Springfield College
Marcus Stewart, M.D., Memphis, Tenn.
Asst. Prof. of Orthopedic Surgery
University of Tennessee
Dana M. Street, M.D., Memphis, Tenn.
Chief, Orthopedic Surgery, VAMTG, Hospital
Raymond S. Weiss, Ed.D., New York
Asst. Professor Physical Education
New York University

DEPARTMENT EDITORS
Art—Charles W. McHugh
BOOK REVIEWS AND ABSTRACTS
Philip J. Rasch
Johannes Timmerman
CHAPTER ACTIVITIES
Arthur Landy
PRODUCTION EDITORS
R. Frank Smotherman Raymond J. Urbaniak
Emmett B. Parr
CIRCULATION MANAGERS
Raymond J. Urbaniak Charles W. McHugh
ADVERTISING MANAGER
Dominic Cuda
9251 W. Swan Circle, Milwaukee 16, Wisc.

SUBSCRIPTION RATES
Membership: Active, $10.00; Professional, $5.00; Associate, $4.00; Libraries, Organizations, $5.00
Single Copies, $1.00

ARTICLES

The Physiology of Progressive Exercise: A Review—Philip J. Rasch, M.A., and Richard V. Freeman, M.D. 35

The Activity Approach to the Training of the Blind—Howard E. Joy 42

An Experiment in Reinforcement of Neuropsychiatric Patients—Robert Kramer, M.A., M.Ed. 44

A Wheel Chair Device For Quadriplegics—Kenneth Dening, M.A. 50

Research: A Study of Cross Transfer of Muscular Strength Gains During Reconditioning of Knee Injuries—Karl K. Klein, M.A., and Harvey E. Williams, M.A. 52

Some Evolving Working Relationships Between Psychology and Corrective Therapy—John Eisele Davis, Sc.D. 54

An Exploratory Training Technique Using Relaxation and Breathing Exercises as an Adjunct in Treatment for Digestive Ulcer Cases—Earl W. Mason, M.A. 56

Working With Neurological Patients Through Corrective Therapy—Leo Berner 57

DEPARTMENTS

FROM OTHER JOURNALS 59

EDITORIALS 60

RESEARCH 61

BOOK REVIEWS 62

CHAPTER ACTIVITIES 64

NEWS AND COMMENTS 64

CLASSIFIED DIRECTORY 68

Copyright 1954 by The Association for Physical and Mental Rehabilitation

THE LOGAN

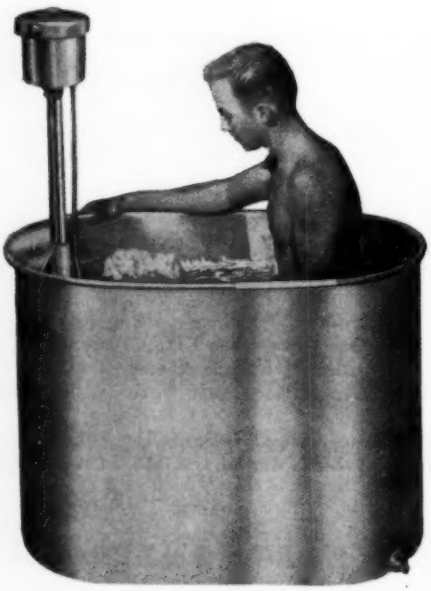
WHIRLPOOL BATH*

Bigger Than Ever — Yet Lower Priced!

Both models 40 in. long x 21 in. wide x 29 in. deep.
Cubic capacity 100 gal. — circulates same water at rate of 3,000 gal. per hr.
Leak-proof, heavy 20 gauge steel.
1½ in. drain. Spring lifts motor.
Champion finished in silver hammertone enamel.
Thermometer. Year guarantee.

THE CHAMPION
(Enameled Finish) $295.00

THE OLYMPIC
(Stainless Steel) $395.00



*THOUSANDS OF LOGAN WHIRLPOOLS IN USE THROUGHOUT U.S.A.

*APPROVED BY LOS ANGELES ELECTRICAL TESTING LABORATORY

Logan, Inc.

MFG. ATHLETIC TRAINERS AIDS

4966 Eagle Rock Blvd. Los Angeles 41, California

OFFICERS

HAROLD M. ROBINSON.....PRESIDENT
2904 Farnsworth, Great Lakes, Ill.
LOUIS F. MANTOVANO.....PRESIDENT-ELECT
37 Clinton Ave., Rockville Center, L. I., N. Y.
FRANK S. DEYOE.....VICE PRESIDENT
89 Spruce St., Saxonville, Mass.
LESLIE ROOT.....VICE PRESIDENT
V.A. Center, Wood, Wisconsin
ROBERT E. SHELTON.....VICE PRESIDENT
University of Ill., Urbana, Ill.
STANLEY H. WERTZ.....SECRETARY
1433 Railton Road, Memphis, Tenn.
ELEANOR B. STONE.....TREASURER
2451 Webb Avenue, University Heights 68, N. Y.
EVERETT M. SANDERS.....DIRECTOR OF PUBLICATIONS
1914 Poplar Avenue, Memphis, Tenn.

ADVISORY BOARD

THOMAS J. FLEMING, Secretary

ARTHUR S. ABRAMSON, M.D.....Bronx, N. Y.
JOHN H. ALDES, M.D.....Hollywood, Calif.
PEARCE BAILEY, M.D.....Bethesda, Md.
DANIEL BLAIN, M.D.....Washington, D. C.
JOHN E. DAVIS, Sc.D.....Arlington, Va.
EVERILL W. FOWLKS, M.D.....Portland, Ore.
EDWARD D. GREENWOOD, M.D.....Topeka, Kansas
RICHARD L. HARRIS, M.D.....Montrose, N. Y.
FRANCES A. HELLENBRANDT, M.D.....Chicago, Ill.
A. B. C. KNUDSON, M.D.....Washington, D.C.
ROSS T. McINTYRE, M.D.....Washington, D. C.
KARL MENNINGER, M.D.....Topeka, Kansas
DONALD MUNRO, M.D.....Boston, Mass.
LOUIS B. NEWMAN, M.D.....Chicago, Ill.
WINTHROP M. PHELPS, M.D.....Baltimore, Md.
RAY PIASKOSKI, M.D.....Wood, Wisconsin
JACOB L. RUDD, M.D.....Boston, Mass.
LEE G. SEWALL, M.D.....Downey, Illinois
HARVEY J. TOMPKINS, M.D.....Washington, D. C.
STAFFORD L. WARREN, M.D.....Los Angeles, Calif.

COMMITTEES AND CHAIRMEN

STANDING COMMITTEES: Chairman and Coordinator: Louis Mantovano; AMERICAN BOARD OF CERTIFICATION OF CORRECTIVE THERAPISTS: Thomas J. Fleming; CHAPTERS: Arthur Landy; CONFERENCE: Earl Raymer; CONSTITUTION: Frank Deyoe LEGAL: Lester Fahey; LIAISON: Mario F. Andriolo; MEMBERSHIP: Leslie Root; NEWSLETTER: Roger Wessel; NOMINATION: Clint Rankin; PUBLIC RELATIONS: George Nash.

ADMINISTRATIVE COMMITTEES: Chairman and Coordinator: Leo Berner; ANCILLARY AFFAIRS: Phil Davis; AWARDS: George Devins; CONFERENCE PROGRAMS: Sam Boruchov; EDUCATION: Karl Klein; EMBLEMS: Lewis Scholl; HISTORIAN: Harlan Wood; MEDICAL LIAISON: Dr. Jacob Rudd; PLACEMENT DIRECTOR: William Zillmer; PROFESSIONAL STANDARDS: Kenneth Dening; REPRESENTATIVE: Chris Kopf; RESEARCH: Dr. A. Ray Dawson and Dr. Edward Greenwood; SURVEY: Ray Robinson.

REPRESENTATIVE ASSEMBLY

Area #1—Charles Bader, VAH, Togus, Maine
Alfred Ellison, 89 Pin Cushion Ro., Framingham, Mass.
Robert Macaluso, VAH, Montrose, N. Y.

Area #2—Arthur Landy, VAH, Chillicothe, Ohio
Chris Kopf, 2015 Birch St., Scotch Plains, N. J.
William Cully, 2613 Sunset Blvd., Bromall, Pa.

Area #3—Paul Fleer, 111 East Mary St., Dublin, Ga.
Arnold Caldwell, VAH, Montgomary, Ala.
Paul Beck, VAH, Augusta, Ga.

Area #4—Lester Fahey, 1315 Harmon Ave., Danville, Ill.
Leon Edman, VA Area Off., Ft. Snelling, St. Paul, Minn.
Raymond Kreich, 51 Keith Drive, Battle Creek, Mich.

Area #5—Louis Scholl, VAH, North Little Rock, Ark.
Robert Swengel, 1312 Jackson St., Topeka, Kans.
Boyce J. Nall, VAH, Temple, Texas

Area #6—Richard Barr, 15136 Germaine St., San Francisco, Calif.
Charles Willhite, 4732 Canehill, Lon@ Beach 8, Calif.
Walter Walkord, VAH, American Lake, Wash.

THE PHYSIOLOGY OF PROGRESSIVE RESISTANCE EXERCISE: A REVIEW

PHILIP J. RASCH, M.A. and RICHARD V. FREEMAN, M.D.*

Since World War II progressive resistance exercises have become generally accepted as a valuable therapeutic technique in Corrective Therapy clinics. Only rarely, however, do schools of physical education offer any instruction in its techniques and physiological aspects. As a result their graduates usually know comparatively little about the subject.

In part this may be due to the philosophy of physical education which was so effectively popularized by Williams and his followers between 1920 and 1940 that it became widely accepted in our teacher training institutions. However, as early as 1936 McCloy[1] vigorously insisted upon the importance of the "physical" in physical education," and more recently Gallagher and DeLorme have squarely faced the philosophical issues involved in advocating such exercises:

> The technique of progressive resistance exercise his important implications beyond the strictly clinical field . . . It relates to that philosophy which in recent years has emphasized the abuse of rest and the need for the development of fitness rather than the avoidance of strain and fatigue and takes isue with those physical educators who emphasize the social-psychological objectives of athletics and neglect the development of adequate muscle-power and endurance.[2]

While every large news stand handles half a dozen magazines devoted to weight training, we know of no single instance in which the editor of such a publication, a manufacturer of weights or the proprietor of a weight training studio has sponsored a controlled study which has contributed to our knowledge of the physiology of exercise. Unfortunately, these publications are mainly devoted to the commercial explanation of narcissistic tendencies, with the result that DeLorme is entirely correct in his contention that:

> While no one would decry the art of weight-lifting as a type of athletics, almost everyone is bewildered and repulsed by the so-called body builder who devotes his energies to developing enormous muscles chiefly for the purpose of public exhibition. In fact, the methods to develop large muscles have been so ridiculously exploited in pulp magazines that the mere mention of large muscles provokes in most people, and especially those of the medical profession, a decided antipathy.[3]

In spite of the hundreds of thousands of words which have appeared in "body-building" magazines each month, Tanner[4] has pointed out recently that we have practically no quantitative information on the degree to which human skeletal muscles can be made to grow by exercise, how much is retained after ceasing to exercise, the effect of exercise on growth, or what sort of exercise is most effective.

*Mr. Rasch is a member of the Corrective Therapy staff and Dr. Freeman is Chief of the Physical Medicine Rehabilitation Service, Neurophychiatric Hospital, Veterans Administration Center, Los Angeles, California.

Our physiologic knowledge about progressive resistance exercise is based upon studies by Siebert and by Morpungo, which have been reported in English by Steinhaus.[5]

Siebert stimulated the muscles in frogs' legs 20 minutes daily for 14 days. He submitted one leg to isometric contractions and the other to isotonic contractions. When the muscles were exercised those submitted to isometric contractions were 13% heavier than their opposites. He then caused rats to run in drums rotated at various speeds. All ran the same distance daily for six months, but those that ran at the higher speeds developed the heaviest muscles. Those run at moderate speeds developed moderately enlarged muscles. No matter how long this rate of running continued, the muscle size remained stationary. Only when the speed was again distincttly increased did the muscles show further enlargement. The amount of work done in a unit of time and not the total work done is the decisive factor in calling out these muscle changes.

Morpungo removed the sartorius muscle from a dog's thigh. After recovery he exercised the dog on a treadmill, during which it ran 50 miles a day for 40 days, and then excised the other sartorius. Both muscles were then measured. Each had about 30,000 fibers, but the exerciser muscle was 50% larger in cross section. The increase in muscle bulk appeared due entirely to an increase in the sarcoplasm.

It is well known that weight training brings about a definite increase in muscular size. This seems to result partly from circulatory and partly from chemical changes in the muscle. Starkweather[6] concluded that the changes in arm girth and volume resulting from doing dumbbell curls were due to changes in the rate of blood-flow as the results of vaso-dilation. Krogh[7] compared an active muscle of one side of the body with the corresponding muscle, inactive, on the other side, and found that in the active muscle the number of open capillaries might range from 40 to 100 times the number in the resting muscle. The precise causes of capillary dilation are not entirely understood. Petren Sjostrand and Sylven[8] noted an increase of about 45% in the number of capillaries in guinea pig muscles during exercise as compared with those not exercised. They suggested that the increase in bulk of muscle during training is due to the increase in the number of capillaries.

Regular heavy muscular work tends to thicken and

toughen the sarcolemma of the muscle fiber, to increase the amount of connective tissue within the muscle, and to increase the content of phosphoreatine, glycogen, non-nitrogenous substances and hemoglobin.[9]

The benefits received by the other systems of the body are a matter of dispute. Cureton comments that "Weight lifting is unquestionably a good body builder for young men but seems to be worth very little for the improvement of cardiovascular condition or agility."[10] His opinion, however, is contradicted by the results of a study made by Capen, who examined a group of weight trainers and a group in a strenuous conditioning course after eleven weeks of training. He found:

> There were no significant differences between the two groups in the improvement in muscular endurance or in circulo-respiratory endurance . . . (Weight training) seems to have been *as effective* in the development of muscular and circulo-respiratory endurance as was the program of Group B, which especially emphasized these endurance factors.[11]

Cotton, Lewis and Rapport[12] had their subjects swing 20 pound dumbbells from the floor to above the head, seven to sixty times. Systolic pressure showed a marked fall immediately after exercise to little, if any, above the normal pressure. About ten seconds later it began to rise, reaching a maximum in 20 to 60 seconds. They explained that during exercise the musculature of the body is tense and the blood is driven from the veins into the arteries. This produces a high systolic blood pressure. Immediately at the end of exercise the muscles relax, the veins take up the blood, the heart is momentarily robbed of its supply, a steep fall of arterial pressure occurs and the pressure remains reduced until the veins fill and overflow. This overflow produces the rise of arterial pressure.

Dawson and Hodges[13] studied the "Valsalva effect," with a view to determine the immediate effect upon the heart rate and blood pressure of muscular efforts which are performed with the glottis closed and which tend to compress the chest, thereby causing a rise in intrathoracic pressure. The Valsalva experiment consists in a forced expiratory movement with the glottis closed. The systolic pressure rose rapidly, followed by an extensive fall. The pulse rate showed a preliminary quickening, an initial slowing and an acceleration which began during the effort and continued from one to ten beats after the effort had ceased. Lifting against the resistance of a dynamometer usually showed essentially the same changes in systolic blood pressure and pulse rate as took place in the Valsalva experiment.

Cannon contends that the higher tension of blood in the arteries develops before the exercise is actually going on. "Indeed, according to Weber, the mere thought of taking exercise leads to the shrinking of the abdominal viscera and to the expansion of the limbs."[14]

McCurdy[15] found that in a maximal back and leg lift, the blood pressure undergoes a sudden and great increase during the lift and rapidly drops to normal after the exercise is completed. One individual had a blood pressure of 111 mm. before the lift, 180 mm. during the lift, and 110 mm. two minutes after the lift. This sudden rise in blood pressure seems to result from the increased intrathoracic and intra-abdominal pressures. McCurdy's findings were confirmed by Karpovich,[16] who added that systolic pressure dropped rapidly below normal even during the expiratory effort after about the seventh heart beat.

Morehouse[17] states that in weight lifting the static contractions of the muscles hinder the venous return of blood to the heart, causing a decreased output during the systolic contractions. The resultant curtailment of blood flow to the brain seems to be responsible for the "blacking out" which lifters sometimes experience.

The marked rise in blood pressure in a single lift is not accompanied by a corresponding increase in pulse rate. McCurdy[18] cites the case of a subject who lifted 484 pounds without any change in the standing pulse rate. In considering McCurdy's studies one point should be noted: he was using a dynamometer, with which muscular contractions would be practically isometric. Whether his findings can be accepted as equally valid for the isotonic contractions of weight training would seem somewhat questionable.

Bramwell and Ellis[19] studied the blood and pulse pressures and pulse rates of 202 Olympic athletes.

PRESSURES

	Systolic Average	Diastolic Average	Pulse Average Pressure
Sprinters	116	77	39
Middle Distance Runners	119	81	38
Long Distance Runners	116	76	40
Marathon Runners	123	78	45
Cyclists, Sprinters	124	86	38
Cyclists, Long Distance	123	76	47
Weight Lifters	134	90	44

PULSE RATES

	Average Resting Pulse Rate
Sprinters	65
Middle Distance Runners	63
Long Distance Runners	61
Marathon Runners	58
Cyclists, Sprinters	67
Cyclists, Long Distance	64.5
Weight Lifters	80

They concluded that these pressures and rates were within the ranges common to people of similar ages.

The basic physiologic and anatomic points have been considered above. We may now turn to consideration of weight training in therapy. In the general medical and surgical hospital the use of weight training is primarily for corrective purposes. Observance of certain established principles will assist the Corrective Therapist in achieving his goals.

1. "The application of physiological laws to muscular development for postural correction requires that the muscle be made to contract with maximum intensity in a steady uniform manner, and that the final position of the joints concerned be firmly held for a few seconds. In order to elicit maximum contraction, the muscle must work against a certain amount of resistance."[20]
2. " 'Correction' depends on increasing the strength of the weaker muscles through 'equalizing exercises'."[21]
3. "Muscles grow larger and consequently stronger only when they are required to perform tasks that place loads on them which are over and above previous requirements."[22] (This is the famous "overload principle.").
4. "The evidence obtained from observing normal subjects indicates that the most important element in augmenting daily work output is the will to put forth an all-out effort. . . . it cannot be overemphasized that no augmentation in muscle power *per se* will occur when the amount of work done per unit of time falls easily within the functional capacity of the groups being treated."[23]
5. "Power-building exercises should, in the majority of cases, be given *below fatigue*. . . . The weight . . . must be large enough to demand more than the normal effort of the involved muscle but less than maximum effort."[24]

6. Heavy resistance exercises of one limb produce a positive and significant improvement in the muscular performance of the contralateral limb. Hellebrandt *et al.* demonstrated that this was true in the case of the quadriceps and Slater-Hammel[25] has shown it applies to the biceps. Hellebrandt *et al.* point out that—

> "The unpracticed limb is not unexercised. It participates in the reflex figure with which powerful unilateral contractions are associated. The tension developed is essentially isometric and hence imperceptible as gross movement . . . These findings suggest that the total work done is unimportant, the determining casual factor in so-called cross education being the severity of the effort."[26]

They suggest that cross education may serve as a useful therapeutic tool in cases in which volitional control is unilaterally defective, or in which contralateral muscle groups are rendered temporarily inaccessible through immobilization.[27]

7. There is some evidence that work done to a definite rhythm is more effective. Hoye[28] used an audio-amplifier to pick up action potentials in the active muscle group and convert them to audible sound waves. She used 16 normal young adult women as subjects, splitting them into two groups. Each did the left hand curl, but the experimental group was told to concentrate on the sound of the action potentials of the prime mover of the elbow joint during volitional flexion and to keep the sounds as large as possible. After completion of a five week training program she concluded that the auditory stimulation provided facilitated the work output (load in kilograms x number of lifts) to a level which approached statistical significance. She believes that it helps fix attention and is conductive to the smooth rhythmical performance of the exercise. At least one weight trainer[29] has described his use of a periodically ringing bell to signal each repetition. He states that other lifters have employed a metronome for this purpose, but the writers have found no reports of controlled experiments in this field.

In a neurophychiatric hospital progressive resistance exercises are of special value for patients prescribed for narcissistic gratification. Since the gratificaton received is dependent largely upon the muscular hypertrophy and strength obtained from the exercise, it is necessary to devote considerable attention to the factors underlying the attainment of this goal.

We pointed out above that the amount of work done in a given unit of time and not the total work done is the decisive factor. Since in any case most patients have only a limited amount of time assigned for Corrective Therapy, the question becomes basically one of using the muscles to accomplish the greatest amount of work in that limited period.

Systems of progressive resistance exercise are numerous. MacCallum put increase in muscular bulk on a nutritive basis:

> If, in the functioning of a cell, certain material is consumed, the cell makes this up by its assimilative processes. If functional activity is maintained at an extreme, so is the assimilation, and the cell even increases its size and functional power. . . . [30]

Reasoning that the way to provide the material for this assimilation was to "flush" the muscle with blood, some individuals have advocated systems consisting of a high number of repetitions. At one tme DeLorme advocated 70 to 100 repetitions.[31]

Studies by Grant have thrown doubt on the value of high repetitions. He measured the flow of blood through a forearm while the hand was exerting a strong grasp. At rest the blood flow rate was about 1.5 cc and was not greatly increased or decreased by warming or cooling the body. When the grasp was maintained at full strength, the limb volume at first fell, due to the blood being squeezed out of the forearm by the contracting muscles. After 3 to 5 seconds the base line began to rise, reaching a maximum of 4 to 5 cc in about 30 seconds, maintaining this figure as long as the grasp continued undiminished. It was found that "If similar contractions are made in succession . . . limb volumes during both contraction and relaxation soon rise to and maintain high levels; these are but little raised by further exercise."[32] Again, however, we have the question of what is very nearly isotonic contraction as against the isometric contraction of weight training, and it is possible that the two conditions may not react identically.

Another approach to the problem is the type of routine described by Crawley:

> When a muscle group, or excised muscle is exhausted for one task (a certain weight) if some of that weight

is removed, the muscles can go on responding. By continually removing fractions of the weight a closer approximation to absolute exhaustion is reached.[33]

In essence this is the heavy and light system long advocated by one of the leading manufacturers of barbells, and one which has been widely advocated for use in therapeutic gymnasia.

Some trainers have inverted this to a light and heavy system by starting out with light weights and adding others as the exercise continues. Experiments by Houtz *et al.* indicate that this is the poorer of the two methods. They trained 16 healthy females for four weeks on heavy resistance exercises of the guadriceps with an iron boot and on curls. They found that:

> Invariably more work was done per diem when the exercise procedure . . . commenced with the maximum load to be lifted and decreasing with the development of fatigue than when the subjects works with increasingly heavy loads.[34]

But the real question is whether any one of these systems is the best method of training. Nearly fifty years ago Mosso reported:

> Dr. Maggiora, in a series of researches carried on in my laboratory, has shown that *work done by a muscle already fatigued acts on that muscle in a more harmful manner than a heavier task performed under normal conditions.* . . . it appears that if the energy of the muscle is not completely exhausted, that is to say, if the final contractions are not made, the fatigue is much less, and the muscle is able to perform more than double the amount of mechanical work which it would do if it worked to the point of exhaustion with the most favorable conditions for repose. . . . the cause of this must be sought in the fact that in its first contractions the muscle does not consume the same substances as when it is fatigued.[35]

In his consideration of the question of whether a muscle should be worked to fatigue or to below the fatigue limit, Kraus reproduces a chart from *Skandinav. Archiv F Physiol* showing that when subjects attempted to lift their maximum capacity each day, there was a temporary decrease of power.[36]

More recently Manzer has written that:

> For efficiency in muscular work, short, frequent rest pauses should be introduced early in the period of work before any falling off of either output or "quality" due to the onset of fatigue; . . . work with tired muscles is extremely wateful.[37]
>
> . . . The general principle is inferred from the data presented that short, frequent rests in the kinds of work studied make for greater efficiency in muscular work than do long, infrequent rests.[38]

From the theoretical standpoint, then, it would seem that a set system consisting of a few repetitions of a heavy, but less than maximal, weight, followed by a rest pause is probably the most efficient way to develop maximum muscle hypertrophy and strength.

The movements should be done slowly; Hill states that " . . . the mechanical efficiency (work/total energy) of muscle is greatest at about 1/5 of the maximum speed."[39]

It is the experience of one of the writers that super-sets, i.e. a movement for one set of muscles followed immediately by an exercise for their antagonists, produces the greatest gains in muscular bulk. However, he has never had the opportunity to test this hypothesis experimentally. Such a program seems too severe for the beginner.

Dr. Harvey Billig has suggested that perhaps the quickest way to gain strength would be to attempt repeatedly to lift a weigh which was too heavy to be moved. Such a theory follows quite logically from the Siebert experiment, and something approaching that is practiced by weight trains who press a maximum weight from head-high standards. However, the writers know of no controlled study of a training system built around such techniques.

It must be recognized that size of muscle girths is not necessarily an indication of the strength of the limb. The "Mr. America" is not the weight lifting champion. Cureton states that "measured amounts of muscle correlate very low with strength test scores or with P. F. I ratings." He goes on to quote a study of college women made by Carpenter in which the girth of the forearm, corrected for fat, correlated only .53 with the strength of the flexors and extensors. Carpenter concluded that her study failed to show any relationship between size and strength.[40]

Actually the effect of exercise is not entirely clear. The mechanism which results in the increase in the size of the muscle tissue is not known and the increase in weight handled cannot be correlated with a parallel increase in muscle size or in strength. Everyone who has worked with the weights has noted that after a few sessions the total which can be handled by an individual often suddenly increases. Obviously the time has been insufficient to allow any great increase in strength. Practice seems to result in ability to perform an exercise with a lessened energy expenditure. Formerly it was said that the individual had "learned" how to lift. By "learning," the kinesiologists explained, they meant that the lifter was now better able to implement "reciprocal innervation of antagonistic muscles," so that he was no longer working against resistance provided by his own body. Recent studies in the field cast doubt on the whole concept of reciprocal innervation in the normal human.[41,42]

It is a matter of common knowledge that heavy exercise should be preceded by a "warm up" period. Not only does this afford an opportunity for circulatory-respiratory adjustment to take place, but the resultant rise in the temperature of the muscle seems to be essential for optimum muscular performance.[43] During a warm up period consisting of a few minutes of light exercise immediately preceding athletic contests such as wrestling and football, Krouse, Wickwire and Burge[44] placed an electrode on the forehead of their subjects as near the motor area as the hair would permit and another on the forearm. The forehead was positive to the forearm while at rest, with a potential difference of 15 to 25 mv. During the warm

up the voltage increased from 50 to 75 mv. During the contests the voltage continued to rise until fatigue and exhaustion set in and then the voltage dropped. Experiments with dogs suggested a rise in the negative potential of the underlying brain cortex during warm up and a fall during fatigue. There is no doubt that factors at the cerebral level play a part in the development of strength, but their role is not understood at present.

In some of the commercially operated gymnasia one hears a great deal about breath control. "Breathe in while curling and out when lowering the weight," the client may be told. The value of such instruction has been succintly stated by Schneider and Karpovich:

> In general, however, it must be admitted that "talks" about respiratory control in athletics are mostly fanciful but futile attempts to interfere with a wonderfully adjusted breathing mechanism.[45]

Lay opponents of progressive resistance exercise are apt to justify their attitude on one of two grounds: They may warn of the danger of injury in handling heavy weights, especially of hernia, or may prophesy that this activity will result in the lifter becoming "muscle bound" and slow. Medical men are more apt to be concerned over its possible effect on the heart, as when MacCallum writes:

> Violent muscular exercise elicits greater activity of the heart, both to create the blood more rapidly and to bring it in increased quantity to the active muscles. The heart may be overtaxed by too great and prolonged effort, so that it dilates and the man falls in a faint or dies.[46]

Karpovich[47] obtained reports covering 31,702 weight trainers. He found that the percentage of injuries was very low and that most of them consisted of "pulled" muscles and tendons. Weight lifters had a much smaller incidence of hernia or hemorrhoids than the male population of the United States. No cases of damaged hearts due to weight lifting were reported.

Recent studies indicate that the old shibboleth of "muscle bound and slow" is also groundless. Capen compared a group of weight trainers with a group taking a strenuous conditioning course. After an eleven weeks program he found that the weight trainers improved significantly more in certain "speed events" than did the conditioning group, although the weight trainers did not practice this kind of an event, while the conditoners did. He concluded:

> . . . it seems that the results of this experiment would point to the probability that weight training, at least when limited to the extent to which it was used here, does not result in muscular tightness and in a decrease of speed of muscular contractions as is commonly assumed.[48]

Zorhas and Karpovich timed the rotary arm motion in a sagittal plane of a group of men who had never indulged in weight lifting and of a group of experienced weight lifters. The weight lifters were statistically and significantly faster in this movement than the non-lifters. The authors summarize their findings as follows:

> The findings of this study appear to be contrary to the common opinion of coaches, trainers, and others associated with physical education who believe that weight lifting will slow down the athlete.[49]

Wilkin measured the speed of turning a bicycle crank. He found that one semester of weight training had no slowing effect on speed of arm movement.[50] A study by Rasch[51] indicated that there were no statistically significant correlations between the speed of arm movement and the arm size and strength. Apparently the inertia of the larger arms is adequately overcome by superior mechanical and muscular components.

At this point it is justifiable to inquire what results a man may expect to achieve by training with the weights. Advertisements to the contrary, the average individual is not going to develop huge measurements and tremendous strength. What is a therapist justified in promising a patient who will train conscientiously for a few months?

Tanner[52] placed ten healthy mesomorphic young men on a weight training routine for four months. In every case there was a significant increase in the circumference of the upper arm, ranging from 4% to 11%. Forearm circumference gains were from 1% to 7%. Five subjects showed significant decreases in thigh circumference, and all subjects showed a decrease in calf circumference. Weight changes were small, but there seemed to be a redistribution of fat. No significant changes were shown in chest circumference or expansion. Apparent strength increases ranged from 10% to 80%, but some of this was due to acquiring techniques rather than to increased strength. In this latter connection, Houtz *et al.* found that the average gain in strength of their subjects was 62%, but they point out:

> How much of the gain in strength demonstrated in these experiments on normal subjects is due to hypertrophy of muscle, how much to improvement of the specific microscopic structure of the contractile tissue, and how much to changes of an unexplained nature occurring in the central nervous system is open to speculation.[53]

Chui[54] studied the effect of training with the weights for three months on the Sargent jump, broad jump, shot-put and 60-yard sprint. He concluded that weight training seemed to result in an increase in the amount of potential power. Araujo[55] compared eleven young men from a regular physical education class in a college with ten men who volunteered to take a weight training program. At the end of seven weeks the weight training group showed significant improvement in anthropometric measurements, speed in the 60-yard dash, grip strength, Sargent jump and a step test. The control group made no statistically significant changes. Masley, Hairabedian and Donaldson[56] found that a six weeks period of weight training increased strength, speed and coordination more than did six weeks of volleyball or inactivity.

In spite of the justifiable criticism which may be directed at commercial exploitation of weight train-

ing, it is evident that the experimental evidence supports the contenton of Morehouse and Rasch that:

> A training program of weights, employed in exercises graded in intensity, offers an excellent means of improving strength and of building up underweight pupils.[57]

SUMMARY

Progressive Resistance Exercise or Weight Training is now an accepted therapeutic technique, but it suffers from lack of adequate teaching in Physical Education curricula and from the stigma of sensationalism seen in "Body Building" periodicals.

Experimental work shows that increases in muscle girth relate to work done within a given unit of time rather than the total amount of work done by the muscle. These changes are circulatory and chemical, with capillary build-up, thickened sarcolemma, increased amount of connective tissue, and increase in phosphocreatine and other chemical constituents.

A number of observers have reported marked increase in arterial blood pressure during exercise and weight lifting, with a steep fall in the pressure with rest, similar to the "Valsalva effect." This increase has also been noted as a psychic result of thinking about such exercise. Available information does not indicate significant increases in pulse rate during heavy lifting.

A series of principles for the Corrective Therapist to follow in working with the general medical and surgical patients as regards weight training is outlined. There guide lines include the following points:

1. The muscles being trained should contract with maximum intensity in a steady manner and hold the final position for a few seconds. This should be done against resistance.
2. Correction depends upon increasing the strength of the weaker muscles.
3. Muscles strengthen only when they work over and above their previous requirements — the "Ooverload principle."
4. The work cannot be easily within the functional capacity of the muscle. There must be a will for a high degree of effort.
5. Power building exercises should be arranged below the point of fatigue or maximum effort.
6. Contralateral muscle groups will benefit from the exercises.
7. The use of sound and rhythm devices is definitely helpful.

Weight training is also valuable to the Corrective Therapist in working with neuropsychiatric patients where narcissistic gratification is important.

The proper techniques for accomplishing the greatest amount of increase in muscle power per unit of time are not well established. Any specific technique or set of techniques seems doubtful. In general it would seem best to encourage a few repetitions of heavy but less than maximal lifting, with frequent rests, and a slow rate of speed during the effort. It is very important not to exhaust the patient or allow exercise to the point of extreme fatigue. Immediate exercise of antagonist following agonist may be helpful.

There is a very poor correlation between muscle girth and power according to the experiments cited. Factors in increasing muscle girth are mentioned above. The actual amount of weight lifted is a complex, resulting from physiologic, chemical and practice or learning factors. The "warm up" may help in optimum muscular performance, but breathing tricks and devices seem to have little effect.

Frequently mentioned dangers of hernia and cardiovascular damage are not borne out by actual survey. The so-called "muscle-bound" effect also seems refuted by the findings. Increase in muscle power does not cause slowness of movement, and controlled weight training studies have shown increases in agility, co-co-ordination and general athletic ability.

Huge measurements and tremendous strength largely are limited to advertising claims, but a significant increase in arm girth and a marked increase in power are reasonably to be expected after a few months of weight training.

BIBLIOGRAPHY

1. C. H. McClov, 'How About Some Muscle?", *Journal of Health and Physical Education*, VII: 302 *et seq.*, May, 1936.
2. J. Roswell Gallagher & Thomas L. DeLorme, "The Use of the Technique of Progressive-Resistance Exercise in Adolesence," *The Journal of Bone and Joint Surgery*, 31-A:847, October, 1949.
3. Thomas L. DeLorme & Arthur L. Watkins, *Progressive Resistance Exercise*, New York: Appleton-Century-Crofts, Inc., 1951. P. 19.
4. J. M. Tanner, "The Effect of Weight-Training on Physique," *American Journal of Physical Anthropology*, 10:427-427, December, 1952.
5. Arthur Steinhaus, "Physiology at the Service of the Physical Educator," *Journal of Health and Physical Education*, 6:36, June, 1932.
6. Esther V. Starkweather, "On the Volume Changes of the Arm During Muscular Exercise," *University of California Publications in Physiology*, 4:200, October 23, 1913.
7. Quoted in Walter B. Cannon, *The Wisdom of the Body*, New York: W. W. Norton & Co., Inc., 1932. P. 162.
8. Quoted in Khalil G. Watkin, "The Physiological Aspects of Therapeutic Exercise," *The Journal of the American Medical Association*, 142:105-106, January 14, 1950.
9. Edward C. Schneider and Peter V. Karpovich, *Physiology of Muscular Activity*, Philadelphia: W. B. Saunders Company, 1948. Pp. 21-24.
10. T. K. Cureton, *Physical Fitness Appraisal and Guidance*, St. Louis: The C. V. Mosby Company, 1947. P. 359.
11. Edward K. Capen, "The Effect of Systematic Weight Training on Power, Strength and Endurance," *The Research Quarterly*, 21:92, March, 1950.
12. T. F. Cotton, T. Lewis and D. L. Rapport, "After-Effects of Exercise on Pulse-Rate and Systolic Blood-Pressure in Cases of 'Irritable Heart', *Heart*, 6·269-284, May 20, 1917.
13. Percy M. Dawson and Paul C. Hodges, "Cardio-Vascular Reactions in the Valsalva Experiment and in Lifting with a Note on Parturition," *The American Journal of Physiology*, 50:481-510, January 1, 1920.
14. Quoted in Cannon, *op. cit.*, p. 161.
15. James Huff McCurdy and Leonard A. Larson, *The Physiology of Exercise*, Philadelphia: Lea & Febiger, 1939. Pp. 95-96.
16. *Ibid*, p. 98.
17. Laurence E. Morehouse and Augustus T. Miller, *Physiology of Exercise*, Second Edition, St. Louis: The C. V. Mosby Company, 1953. Pp. 86-87.

18. McCurdy and Larson, *op. cit.*, p. 64.
19. Quoted in Schneider and Karpovich, *op. cit.*, p. 197.
20. Gertrude Hawley, *The Kinesiology of Corrective Exercise*, Philadelphia: Lea & Febiger, 1949. P. 37.
21. Arthur H. Steinhaus, *Lectures on the Physiology of Exercise*, Second Edition, Chicago: George Williams College, 1950, P. 5.
22. *Ibid.*
23. Sara Jane Houtz, Annie M. Parrish and F. A. Hellebrandt, "The Influence of Heavy Resistance Exercises on Strength," *Physiotherapy Review*, 26:303, November-December, 1946.
24. Hans Kraus, *Principles and Practices of Therapeutic Exercise*, Springfield: Charles C. Thomas, 1949. Pp. 16-17.
25. Arthur T. Slater-Hammel, "Bilateral Effects of Muscle Activity," *The Research Quarterly*, 21:209, October, 1950.
26. F. A. Hellebrandt, Annie M. Parrish and Sara Jane Houtz, "Cross Education," *Archives of Physical Medicine*, XXVIII: 83, February, 1947.
27. *Ibid.* p. 85.
28. Anna Scott Hoye, 'Use of Audio-Amplifier as a Means of Facilitating Work Output: Strength Development Through a Program of Progressive Resistance Exercise," *Journal of Applied Physiology*, 4:215-222, September, 1951.
29. Maurice Uzick, "The Muzick Box," *Iron Man*, 11:26 *et seq.*, February and March, 1951.
30. W. G. MacCallum, *A Textbook of Pathology*, Seventh Edition, Philadelphia: W. B. Saunders Company, 1940. P. 187.
31. T. L. DeLorme, "Restoration of Muscle Power by Heavy Resistance Exercises," *Journal of Bone and Joint Surgery*, 27:648, October, 1945.
32. R. T. Grant, "Observations on the Blood Circulation in Voluntary Muscle in Man," *Clinical Science*, 3:166, April 28, 1938.
33. S. L. Crawley, "An Experimental Investigation of Recovery from Work," *Archives of Psychology* No. 85, October, 1946. P. 52.
34. Houtz *et al.*, *op. cit.*, pp. 300-301.
35. A Mosso, *Fatigue*, New York: G. P. Putnam's Sons, 1906. Pp. 151-152.
36. Kraus, *op. cit.*, p. 15
37. Charles W. Manzer, "An Experimental Investigation of Rest Pauses," *Archives of Psychology* No. 90, July, 1947, p. 76.
38. *Ibid*, p. 83.
39. A. V. Hill, "Voluntary Muscle—The Mechanics of Its Active State," *The Times Review of the Progress of Science*, 1:13, August, 1951.
40. Cureton, *op. cit.*, p. 362.
41. Milton G. Levine and Herman Kabat, "Cocontraction and Reciprocal Innercation in Voluntary Movement in Man," *Science*, 116:116-118, August 1, 1952.
42. H. J. Ralston and B. Libet, "The Question of Tonus in Skeletal Muscles," *American Journal of Physical Medicine*, 32:85-92, April, 1953.
43. DeLorme and Watkins, *op. cit.*, p. 12.
44. R. Krouse, G. C. Wickwire and W. E. Burge, "Warm up Period in Physical Exercise in Relation to Brain Potential," *Federation Proceedings*, Part II, p. 57, February, 1946.
45. Schneider and Karpovich, *op. cit.*, p. 82.
46. MacCallum, *op. cit.*, p. 453.
47. Peter V. Karpovich, "Incidence of Injuries in Weight Lifting," *Iron Man*, 11:46-47, September-October, 1951.
48. Capen, *op. cit.*, p. 92.
49. William S. Zorhas and Peter V. Karpovich, "The Effect of Weight Lifting Upon the Speed of Muscular Contractions," *Research Quarterly*, 22:145-148, May, 1951.
50. Bruce M. Wilkin, "The Effect of Weight Training on Speed of Movement," *The Research Quarterly*, 23:361-369, October, 1952.
51. Philip J. Rasch, *The Relationship of Arm Strength, Weight and Length of Speed of Arm Movement*, Unpublished Master's Thesis, University of Southern California, February, 1951.
52. Tanner, *op. cit.*, pp. 429-450.
53. Houtz, *et. al.*, p. 302.
54. Ramon Anthony Araujo, Jr., *Some Physiological Aspects of Weight Training*, Unpublished Master's Thesis, University of Southern California, June, 1949.
55. John W. Masley, Ara Hairabedian and Donald N. Donaldson, "Weight Training in Relation to Strength, Speed and Co-ordination," *The Research Quarterly*, 24:308-315, October, 1953.
56. Laurence E. Morehouse and Philip J. Rasch, "Weight Training," *Scholastic Coach*, 12:12, December, 1947.

Announcement

8th ANNUAL

Scientific and Clinical Sessions

A FEW OF THE INFORMATIVE PANELS YOU WILL WANT TO HEAR

1—Rehabilitation Following Repair of Shoulder Dislocations
2—Arthroplasty of the Hip: Indications and Treatment
3—Poliomyetitis: A Peripheral Motor Neuron Lesion
4—Rehabilitation of the Hemiplegic.
5—Modern Concepts of the Geriatric Patient
6—Advances in the Treatment of Arthritis
7—The Cardiac Patient and His Rehabilitation
8—Group Approach to the Psychiatric Patient

THERE ARE MANY
CLINICAL DEMONSTRATIONS AND EXHIBITS YOU'LL WANT TO SEE

ASSOCIATION FOR PHYSICAL AND MENTAL REHABILITATION

Hotel Hollander, Cleveland, Ohio

JUNE 28 - JULY 2, 1954

THE ACTIVITY APPROACH TO THE RETRAINING OF THE BLIND

HOWARD E. JOY*

Several years ago at Wood, Wisconsin, we started the Rehabilitation Program For The Blind. We have about fifty blind patients, most of whom are World War I veterans, with a few from the Spanish American War. During the initial inteviews in getting the program started, we encountered different types of visual handicaps—totally blind, partially blind, and partially sighted. Naturally, the problem of rehabilitating these men is extremely difficult and varied. The success of such a program depends on many factors. The native ability, the intelligence, and the previous training these men have had are factors over which we have no control.

A blind person, especially one newly blinded, is confused. This is due to panic and fear. Fear in its various forms is their worst problem. It must be dispelled quickly. Any early encouragement of self-confidence goes a long way toward successful blind rehabilitation.

There are many degrees of sight failures, each with a complexity of psychological factors to consider. The blind can never be treated as a homogenous whole. There is the background from which they spring, the world in which they live—economic, social, cultural. To some the lack of sight means *darkness,* to *others* it is a *white pearly* or *yellowish fog.* Many so-called blind people have light perception, since only about 20% are totally blind. Some see trees, building masses, shadows as through fog. The only blind who can talk of darkness with understanding are those with merely visual memory. They do not see it as the darkness of night, but as a vacuum of unreality.

The most important adjustment for the blind person is to make a satisfactory psychological adjustment to his own loss of vision. Here, adequate guidance is absolutely necessary to avoid acquiring blindism, in overcoming frustration, in gaining skill and confidence to a life adjusted to society. At this stage it is necessary not only to sustain the patient's morale, but also to begin his orientation training. He should be taught to do things for himself, to overcome and dispel the feeling of helplessness.

Our rehabilitation program for the blind at Wood consists of rug weaving, typing, Braille, leather work, and the orientation training program. This training program for the blind must be an individualized process. Naturally, there are basc techniques and general instructions for such a training project. These include familiar land marks, development and maintenance of proper sense of directions, interpretations and utilization of sound, smell, foot terrain, air currents, curbs, and shorelines. Once mastered, these aids let the patient know where he is, where he is going, how to get there and return.

We have our orientation program divided into three phases—inside orientation, outside orientation, and off-the-post orientation—with progression from one to the other as the patient masters skill and confidence and interest and enthusiasm to achieve his final objective—independence.

Inside orientation begins with general familiarization to the patient's immediate environment. This is accomplished by having the patient follow the therapist around the room, down corridors, etc., through effective use of hands and arms.

CORRECT METHOD OF FOLLOWING THE THERAPIST:

Have the patient take your elbow and follow after your movements in a relaxed and confident manner.

CORRECT METHOD OF STOOPING

The patient may use either arm in front of the chest and across the body, with the upper arm at right angles to the shoulder and parallel to the floor, the forearm is parallel to the floor and at right angles to the upper arm, the finger extended and relaxed.

CORRECT METHOD OF TRAILING WITH THE BACK OF THE FINGERTIPS:

Have the patient use the hand next to the wall, with the hand below the belt and the fingers pointing to the rear. In this manner the back of the hand is used to get the direction of the corridors, plus counting doors and other land marks.

USE OF THE CANE:

We have found at Wood that the Hoover Method of Foot Travel, namely, the use of the cane with its variations affords the best systematic aid for mobility by the blind. Mastery of the cane encourages the patient to venture forth on his own, providing a safe method by which he can travel without help. The confidence and ease with which a blind person travels by himself depends very largely on the extent to which he can supplement the proper use of the cane with auditory ability, which is essential for orientation in the total and immediate environment. Confidence is the primary factor in travel for the blind person. This training is tiresome and difficult, but it is also found to be rewarding. The blind like the sense of accomplishment that goes with it, and the

*V.A. Center, Wood, Wisconsin

freedom from the guiding hand of the sighted.

The use of the cane has to be studied, like every new phase they enter. They are shown how to discover objects and depressions with it and how to detect landmarks along the course they must travel, so as not to be confused or lost. The cane is aluminum and 48 inches long.

A. THE GRIP:

The cane is held in the palm of the hand. It should balance with the pressure points in the palm of the hand and on the middle finger at approximately the second joint. The index finger should be alongside the cane. The thumb should be on the inner side of the cane to keep it from swinging out. The last two fingers should not be used in holding the cane, but relaxed.

B. THE ARM:

The arm should be held with the elbow resting close to the hip. The hand should be slightly elevated and directly in the middle of the body and below the belt.

C. MOVEMENT OF THE CANE:

The wrist moves back and forth pivoting the cane so that the tip describes an arc before the user. The tip of the cane strikes a point directly in front of the foot which is about to be moved forward, examining the spot where the foot will be placed, assuring that the foot has a safe place upon which to alight.

Check—grip, arm, wrist movement, rhythm, arc of cane, posture, and poise.

Always have the patient walk easily and relaxed and in a natural strolling manner.

SOUND INTERPRETATION—VOICE AND OTHER MEANS, PERCEPTION OF OBJECTS:

Any object with a large surface can be located at a safe distance without touching it. To cultivate this perceptive ability, have the patient walk slowly, leisurely, and in a relaxed manner toward the wall. Have him watch carefully for the time he first feels the presence of something in front of him. It will register on the nerves of his face around the eyes and he will feel as though he were walking into a shadow. With practice and conscious effort he will soon be able to detect its presence and the exact distance without touching it. This perceptive ability will be valuable when he is strolling outdoors.

DESCENDING THE STEPS:

When the cane picks up the stairs, have the end of the cane resting on the first step. Then step up to the cane with the toes projecting over the stairs. Take the cane and check the right side for *clearance,* then check the depth and width. Now the arm is extended away from the body and the end of the cane is held diagonally across the body about two inches beyond the opposite side, just clearing the steps as the patient walks down. In this manner the end of the cane will pick up the floor as the patient steps down the last step.

OUT DOOR ORIENTATION:

Now the patient is ready and is introduced to outside traveling. Familiarization with sidewalk travel and then gradually exposed to shorelines, curbs, the crossing of streets and the general hazards of outdoor travel.

OFF POST ORIENTATION:

The patient is taught to use public conveyances, to find the fare box, to reach a seat without assistance, to cope with revolving doors, elevators and other forms of public transportation.

Our objective is to teach the blind to be independent—that is *to live and work again.* The keystone is to develop his confidence in himself and in others.

Here are a few suggestions that will help you:

1. When walking with a blind person, helping him across the street, on a bus or streetcar, never take his arm and attempt to guide him by pushing, shoving or boosting. Offer him your arm and he will follow you easily in a relaxed and confident manner.

2. When being introduced to a blind person always shake hands. Even if he does not offer his, reach out and take it. Remember that touch now takes the place of sight to a great extent, and while he cannot see your smile of friendliness, he can appreciate the warm clasp of your hand.

3. Always address him directly, never through his guide or companion. If you do not know his name, lean toward him and touch his arm or shoulder lightly to indicate that you are addressing him.

4. Never ask a blind man how he lost his sight. It's bound to be a painful subject.

5. If an unaccompanied blind person enters a room where you are, let him know of your presence by greeting him. If he is unfamiliar with the room, offer him your arm and guide him to a chair.

6. Never on any account make a blind person's decisions for him. Give him whatever facts he needs to enable him to size up the situation, but let the final word come from him.

See p. 63 for "A Dozen Don'ts in Dealing with the Blind."

Vacancy-GS-5—Corrective Therapy

Bath VA Hospital at Bath, New York is in drastic need of a G. S. 5 Corrective Therapist. Please utilize all channels of information to attempt to fill this need.

AN EXPERIMENT IN REINFORCEMENT OF NEUROPSYCHIATRIC PATIENTS*

ROBERT KRAMER, M.A., M.Ed.**

In the treatment of general medical and surgical patients many devices, tests and measurements are used in corrective therapy in order to consider as objectively as possible the improvement of the individual himself or of his afflicted part. It is relatively easy to measure the increase in strength, endurance, reaction time and/or coordination.

With psychiatric patients, corrective therapy has not applied objective methods of measuring improvement. Observation by more or less well-trained instructors was the basis of an evaluation of progress. This is, of course, purely a subjective method of measurement and it does not establish a standard so that individual or group comparison can be made.

In order to measure objectively the results of specific corrective activities, a test was organized to determine:

a. If learning takes place in psychiatric patients.
b. How much learning takes place in psychiatric patients.
c. If standard educational methods help the learning process.
d. If some educational methods bring better results.

A readjustment of some psychiatric patients to reality is noticeable during the time of hospitalization. It is asumed that such a change in attitude and relearning of correct behavior patterns is the result of many stimulating factors. Corrective therapy in its guidance of patients toward more independency is employing methods accepted by progressive education. Dr. John E. Davis states:

> The ideal is to do something along with the patient rather than something to him, to help himself, to give him the satisfaction of becoming the master of his soul . . . He is not subject to treatment and medical trappings. Treatment does not become a formal expression of authority nor a ritual of white gowns. It becomes a personalized expression of human need and human feeling and interest.[1]

In the teaching and training of activities believed useful to his adjustment, motivation and voluntary acceptance of treatment by the patient are of great importance. It is probable that continuous praise and encouragement as well as thorough explanation to him can be an aid to higher performance and to a better rate of learning. This is accepted and practiced in some organizations concerned with re-education of psychiatric patients[2]. No previous study was found measuring the value of reward or reinforcement of patients in corrective therapy. Stevens[3] cites experiments by Thorndike, Hull, Spence and many more that give considerable evidence of the influence of reinforcement, especially praise and information, on learning. Applying the principle of reinforcement to this study it would follow that patients' behavior may also be influenced in a certain direction. Apparently many psychiatric patients respond to internal stimulation to such an extent that they fail to react appropriately to environmental stimuli. If such outside stimulation can be strengthened by the use of praise and/or information (reinforcement) it may overcome stimulation from within the individual which previously prevented him from close contact with reality. Thorndike's experiments also call attention to the importance of information as a motivating condition in human learning.[4]

An experimental study showed that the same group of subjects performed superiorly in a test when they were informed about the results compared to a previous test where no information was revealed. Knowledge of results (Thorndike 1927) has been shown to be a strong motivating factor in the learning of children and adults. It is reasonable to assume that such knowledge of results may also be of value in the instructions to patients.

The experiment described and discussed in the following pages is an attempt to support the assumption that reinforcement in the form of praise and/or information is of help in the re-education process of psychiatric patients.

The subjects making up the total sample in this investigation were male psychiatric patients, obtained from the patient population at the Sheridan, Wyoming Veterans Administration Hospital. When contacted they were told that it was a research project to establish the value of the stationary bicycle as exercise

---

*A condensed and abridged copy of the original thesis submitted to the faculty of the Graduate School of the University of Colorado in partial fulfillment of the requirements for the Degree, Master of Education.

**Chief, Corrective Therapy, Veterans Administration Hospital, Sheridan, Wyoming.

[1]John E. Davis, Sc. D., Corrective Therapy, an Orientation as to Its Function and Meaning, *Journal of the Association for Physical and Mental Rehabilitation*, Vol. 3, pp. 3-6, June 1949

[2]J. H. W. Von Ophuijsen, M.D., Principles of Emotional Rehabilitation, pp. 15-18. Harvey J. Tomkins, M.D, Rehabilitation of the Neuropsychiatric Patient, pp. 18-21.

[3]S. S. Stevens, Handbook of Experimental Psychology, (New York: John Wiley and Sons, Inc., 1951), pp. 630-632, 692-694, 1267-1270.

[4]Ibid., p. 630

equipment. Any subjects reluctant about participating were cheerfully excused. No pressure was exerted in order to persuade them to volunteer. In this manner it was felt that all subjects would be adequately motivated and full cooperation would be secured.

There were 36 subjects and they were divided into four equal groups, by chance and randomization methods. They did not know to which group they belonged, at what time they would be tested, or in what order they would be tested. All were between 25 and 35 years of age. The mean age at the time of the experiment was 30.4 years. They had no known physical deficiencies. The diagnosis for all was schizophrenic reaction and they were judged by the psychiatrist to be psychotic and in good to poor condition. All subjects belonged to the Acute Intensive Treatment Service but were from four different wards which make up the building.

The main apparatus consisted of a stationary bicycle, and a silent stop watch. One completed circle by the indicator of the Gym-Cycle was equivalent to .1 of a mile in distance. Exact readings of .001 of a mile were made possible by a division of the indicator circle into one hundred degrees. The resistance adjustment was set to the approximate resistance encountered by a normal two wheel bicycle used on the road, and kept on the same, exact, constant resistance figure all through the testing. The whole apparatus was kept in good condition and was checked before, during and after each individual test. It was used only for the experiment. The silent stop watch was a Gallet Timer, No. 302, measuring time to .2 of a second. The stop watch was also checked every day and its performance apparently was satisfactory all through the experiment.

The actual experiment lasted for 10 working days, divided into two successive working weeks which lasted from Monday to Friday inclusive. The experiment was started on January 19, 1953, and was completed on Jan. 30, 1953. All testing took place between 8:30 a.m. and 11:30 a.m. At that time subjects are considered less fatigued and there is little interference from other activities.

Patients were tested by wards. The order of testing by wards, identified as Wards A, B, C, D, was also randomized.[5] As previously indicated there were four equal groups of patients. Therefore each ward had subjects of several of the four groups which received the numbers, I, II, III, IV. The order of testing of the individual subjects within wards was also randomized. The instructor supervising the testing was the only person who was familiar with the number assigned to ward and individual subjects by the random tables. Neither personnel nor student patients had any information about it. It was assumed that the procedure of randomization would assure a chance order of testing. Therefore, every subject had the same chance to be tested first, last, or in any certain preferred position.

The waiting room was separated from the actual testing room by a sound-proof door and the patients waiting there were not able to observe the individual subject taking the test.

The subjects were previously instructed on an individual basis when first approached for participating in the test. Assembled by wards they received the following general instructions each day before the test started:

> This is a test to find out how good the stationary bicycle is as exercise equipment. All you have to do is pedal the bicycle every day for a short time. As long as the test lasts you will not use the bicycle otherwise but only for the test.

The subjects assembled in the waiting room were told to relax until called for the test. All questions which did not refer to the above quoted general directions received noncommittal replies. If the general instructions were not clearly understood by part of the ward or by the whole ward, they were repeated and explained so that all received the same amount of instructions.

When a subject first entered the testing situation, i.e., the actual testing room, an attempt was made to put him at ease and to establish good rapport before beginning the testing. Then each subject received the following instructions individually:

> Mr. X will you please get on the bicycle. When I say GO you are to start pedaling as fast as you possibly can. I want you to keep on pedaling as fast as you can until I tell you STOP. When I say STOP, remove your feet from the pedals right away.

Care was taken to make sure that every subject understood the instructions which were given individually. They were sometimes repeated or explained, but no other words were used.

As soon as the signal to GO was given by the instructor the subject started to pedal the bicycle. He was not able to see the stop watch and therefore could not know how long the test lasted nor how much he had pedaled at any given time. He was able to see how many laps (one lap representing .1 of a mile) he completed from the signal to Go to the signal to Stop. Actually, only three subjects out of 36 counted their laps while pedaling and that occurred only in the first two tests. The rest of them, and beginning with the third test, all of the subjects assumed a racing position with their heads down, watching their feet and apparently trying to achieve the maximum distance. Thus the subjects did not know at the end of the test what their score was.

Following the one minute test period, the individual subjects achievement was at once recorded on a pre-

[5]George W. Snedecor, Statistical Methods (Ames, Iowa: The Iowa State College Press, 1946), pp. 10-13.

pared table, without showing the figures to the patient.

If the subject belonged to Group I, he received the following verbal reinforcement and graphic explanation of his score:

> Mr. X you did very well today. That was very, very good. With more practice you probably can do even better tomorrow. Thank you. Here is your score. That is what you did today. Here is what you did yesterday.

His score was explained to him using a graph on which his score was recorded after every test. From the graph the subject was able to distinguish between increase or decrease of his daily achievement but was not able to learn from the graph his numerical score. It was felt that such system minimized the competition between the subjects.

No subject was able to learn about the achievement of other patients tested. An attempt was made to keep all other factors constant so that any difference in performance between groups could be attributed to the reinforcement variables. As indicated previously, the experiment was designed to investigate the effect of praise and graphic teaching methods or reinforcement on behavior of the subjects.

Subjects belonging to Group II received the same verbal reinforcement that subjects of Group I received. It was made certain that they understood and comprehended the instructions. No graphic demonstration of progress was given to this group nor was any other explanation of their score given to them. After each individual test the instructor said:

> Mr. X you did very well today. That was very, very good. With more practice you probably can do even better tomorrow. Thank you.

Any questions pertaining to their scores or any other subject's score were again answered in a polite but noncommittal manner. The score expressed in numbers was recorded on the previously prepared tables, after the subject has left the room. No graphic record of scores for Group II was kept by the instructor.

Subjects belonging to Group III received explanation on the score by graphic methods only. After the subject finished the test, the instructor explained his score to him with the help of a graph the same way as it was explained to the subjects of Group I. No verbal reinforcement was given to Group III. Not even the phrase "thank you" was used since it was felt that it might constitute some kind of reinforcement or encouragement.

As in the case of Group I, the instructor made certain that the patient could read the graph and was able to find out for himself what kind of progress he made. There were some difficulties in the first three days but by the fifth day all 18 subjects of Group I and III had learned how to read their own graphs.

Subjects belonging to Group IV left the testing room without any comment by the instructor. No reinforcement of any kind was given. All questions were answered in a noncommittal manner. It was made certain that they did not notice that a record of their scores was made.

In summary, 36 subjects were divided into four equal groups, three experimental groups and one control group. All were tested individually and received the same standardized instructions prior to testing. All subjects underwent the same test of performance, however the three experimental groups received different types of reinforcement while the control group received no reinforcement at all.

The hypothesis being tested is that the rate of learning and the level of performance will be highest with both the verbal and graphic reinforcement; second, that verbal reinforcement will be superior to graphic reinforcement but less effective than both verbal and graphic and less efficient than verbal reinfircement alone; and fourth, that the control group or group which received no reinforcement will show the lowest rate of learning and level of performance.

As pointed out previously the test scores were recorded in the absence of the subjects on prepared tables organized by wards and later transferred on tables, organized by groups. It was felt that this arrangement would provide an easier and better manipulation of the raw scores by groups, days of tests, or in the comparison of individual achievements.

All eleven tables, statistical calculations, formulas etc. presented in the original thesis are here omitted on account of shortage of space in this publication.

The mean group performance of the first test showed:

1. Group III with the highest mean of .347 mpm*
2. Group IV with the second high mean of .315 mpm
3. Group I with the third high mean of .314 mpm
4. Group II with the lowest mean of .243 mpm

The mean group performance of the last test showed:

1. Group I with the highest mean of .484 mpm
2. Group II with the second high mean of .438 mpm
3. Group III with the third high mean of .427 mpm
4. Group IV with the lowest mean of .379 mpm

The mean group performance for all tests showed:

1. Group I achieved the highest total mean of .463 mpm
2. Group III achieved the second high mean of .428 mpm
3. Group II achieved the third high mean of .416 mpm
4. Group IV achieved the lowest total mean of .362 mpm

A change in performance is noticeable for all groups. Therefore it was felt that a statistical analysis was warranted and should consist of: (a.) an analysis of variance or F test, to investigate the difference *between the groups* on the first day, (b.) the test to investigate the significance of the difference between means of the first day and the fifth day for each group, and (c.) a test to investigate the difference between the total means of all groups.

It is apparent that although Group I and IV showed similar results on the first day, Group II and III appeared somewhat different. It was believed that

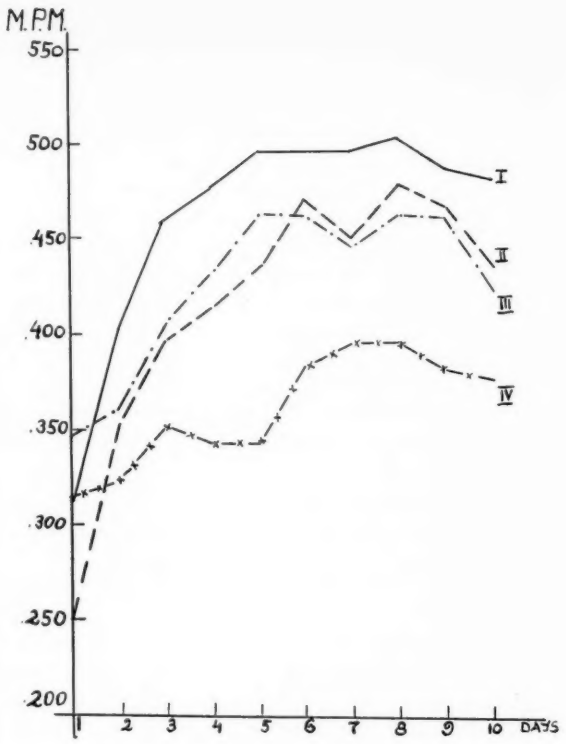


Figure 1

Daily mean performances of all four groups
One inch represents .05 MPM
One half inch represents one test day.

an F test would further demonstrate whether the groups differed significantly prior to reinforcement.

The analysis of variance of the first day's score was carried out according to the method suggested by Guilford.[6] The results of the F test indicate that the difference between the groups on the first day are not significant. Therefore it may be assumed that the distribution of subjcts and groups was according to chance. F is 1.43[7]

In order to determine whether the increase in performance within the groups was significant a "t" test between the first and the fifth day was computed. A pilot study carried out three weeks before this experiment was started, indicated that the asymptote of the performance curve occurred in that exercise between the fifth and eighth day. From the raw scores it can be seen that after the eighth day no group and/or individual increased the performance. The fifth day was the last day of the first week and occurred before a two day rest. It was the halfway mark in the experiment, therefore, the fifth day was compared with the first. The results of the pilot study suggested also that the experiment should be limited to ten days. Since the mean scores of the first and fifth day involved the same subjects and were therefore correlated, the "t" test suggested by McNemar[8] for correlated means was used.

The calculations for "t" between the first and fifth test in:

Group I (verbal and graphic reinforcement) was 5.53
Group II (verbal reinforcement only) was 3.898
Group III (graphic reinforcement only) was 4.277

All three reinforced groups show figures for "t" which is significant at the .01 level.[9] Group III shows the highest mean for the first day. On the second day the picture has changed considerably. Group I had overtaken Group III and produced the highest mean performance, for each day of the experiment from there on. Such apparent superiority by Group I in comparison with all other groups may not serve alone as a basis for a comparative analysis of the performance between the groups. It should be remembered that this is still an analysis of the increase *within* the group. Group IV, the control or non-reinforced group, showed a non-significant increase of performance. That indicates that actual increase of the fifth day compared with the first day by Group IV, may be due to chance. Since "t" equals 1.304 the probability of such an increase could occur twenty to thirty times out of one hundred.

In summary it may be stated that Groups I, II, and III show a significant increase in the fifth test, compared with the first day of the experiment. Group IV shows no significant increase. It may therefore be assumed that the significant increases within Groups I, II, and III may be the result of the reinforcements received, while the non-significant increase by Group IV may be the result of lack of reinforcement.

This furnishes support for the hypothesis which states that the rate of learning and the level of performance will be superior within the reinforced groups as compared to the non-reinforced group.

The significant increase in all three reinforced groups suggests a further analysis of the increase *between* the groups. It was felt that such an investigation should compare the mean performance of each group. The "t" ratio was against selected to determine the significance of the differences between the means of the four groups. With four groups, six such comparisons between groups are possible. Fisher's formula for testing the significance of differences between groups was used. Since all four samples are of equal size, i.e., ten means for each group, the simplified formula 9.40 in Guilford[10] was employed.

Resulting calculations show that there is a significant difference in performance between Group I and

[6]J. P. Guilford, Fundamental Statistics in Psychology and Education (New York: McGraw Hill Book Corp., 1950), pp. 239-240.
[7]Ibid., p. 613
[8]Quinn McNemar, Psychological Statistics New York: John Wiley & Sons, Inc., 1949, pp. 225-26.
[9]Ibid., p. 352.
[10]Guilford, *op. cit.*, p 228.

IV, II and IV, and III and IV. The probabilities that such differences would occur by chance are remote. For Group I and IV as well as III and IV they are less than .01. For Group II and IV the probability is less than .05 but more than .02 therefore still quite significant.

Thus a further support for the hypothesis that the rate of learning and level of performance is superior in the reinforced groups compared to the non-reinforced group is indicated.

The difference between Groups I and II, and I and III, III and II, are NOT significant, i.e., the difference between the groups may occur by chance more than ten times out of one hundred. Therefore the following hypotheses were not supported:

> That verbal reinforcement will be superior to graphic reinforcement but less than both verbal and graphic reinforcement. That graphic reinforcement will be inferior to verbal reinforcement and to both verbal and to both verbal and graphic reinforcements.

Further investigation would be necessary to determine the relative effects of the two kinds of reinforcements as compared to either one, or the relative effect of one kind over the other.

PATIENT REACTIONS TO THE EXPERIMENT

Immediately before the first test 29 patients or close to 82% of the subjects appeared more nervous, tense, suspicious and awkward than before other activities with no tests involved. Subjects of Group I expressed satisfaction after having received praise, encouragement and graphic explanation of their scores. They seemed to have recovered more quickly from their physical exertion and they gave a relaxed impression of well-being. Similar behavior could be observed from subjects belonging to Group II. Subjects of Group III expressed a strong desire to see their score in numbers. Some of them were confused at first by looking at the presented graphs. This was also apparent from some of Group I but they learned more quickly to read the graphs than subjects of Group III. Subjects of Group IV appeared unsatisfied. They believed that praise, encouragement, and explanation was given only to patients who performed well. They expressed feelings and ideas of being punished. They manifested a depressed attitude over their failure and acted somewhat aggressive toward the instructor and the rest of the ward population.

Before the second test started 18 patients or 50 percent still appeared tense and nervous. A gradual slow adjustment to procedure and condition could be observed. The demands of subjects belonging to Group III to see their scores grew even stronger. Some of Group I and II wanted to know the scores of others, if not in number at least in general terms. They developed a strong competitive attitude toward the test. A marked loss of interest could be observed in Group IV. A majority of them wanted to know how much longer the test would last.

Before the third test only five patients showed signs of nervousness and tension. These signs were not as pronounced as on previous test days. A majority of subjects belonging to the reinforced groups continued to try to apply pressure on the instructor to reveal their scores in order to make comparisons. Subjects of Group IV did not show interest in the test and expressed disgust. Many were doubtful if the aim of the test was really to find out the value of the stationary bicycle. Some believed the test would show that the stationary bicycle was not good as exercise equipment. Most of the complaints and expressions of doubt came from Group IV. Some came from Group III, but none from Groups I and II. The best cooperation was furnished by Group I. Subjects of that group showed the most enthusiasm and appeared satisfied with the test.

It could be observed that subjects of the reinforced groups learned much faster than subjects of the non-reinforced group. That rate of learning was not only expressed in a faster increase and higher level of performance but also in saving energy. For instance, subjects of Groups I, II and III discovered much faster and in bigger numbers the energy saving use of the toe straps attached to the pedals. After the second and third test, they did not spend all their energy in the first twenty or thirty seconds of the minute long testing. They learned from the experience of the first and second test that a more even effort during the whole minute would result in the same or better performance with less work.

Subjects of Group IV seemed to need more time to find out the value of the toe strap and loss of efficiency resulting from pedaling at maximum strength in the beginning of each test. While all subjects of the reinforced groups needed only three days to learn the use of the toe strap, it was not until the seventh day that all of the subjects of the non-reinforced group were using it. Only six out of nine subjects belonging to Group IV learned from the whole experiment a more economic use of their strength. After the fourth test all subjects apparently became used to the test routine and relatively few difficulies were encountered. After the seventh test a slight loss of interest by all the subjects could be observed. It appeared that the reinforced groups became conditioned to the stimulations and the reinforcements lost part of their meaning. Remarks such as:

"I know the instructions by heart. Don't tell me again." or parroting of the praise and encouragement phrases given by the instructor became more frequent.

When the experiment was terminated almost all subjects of the reinforced groups expressed willingness to volunteer for another experiment if called upon. None of Group IX expressed such a desire. A reward in the form of candy was then given to *all* the

subjects and their scores as well as the real meaning of the experiment was explained to them.

CONCLUSIONS

The purpose of this study was to investigate the value of reinforcement in certain rehabilitation activities of neuropsychiatric patients. The result of the experiment on which this study was based may suggest that praise, encouragement and explanation can be of aid to a higher level of performance and a better rate of learning. Persons concerned with the re-education of neuropsychiatric patients are often unaware that directed responses are possible even from patients in poor contact. Therefore, it may be assumed that in neuropsychiatric patients:

The appearance or strengthening[11] of a conditioned response . . . takes place through reinforcement.

After either reinforcement or both reinforcements the following results were observed:

1. The level of performance within the reinforced groups changed significantly. The non-reinforced group did not change its performance to a significant degree.

2. The difference of performance between the reinforced groups and the non-reinforced group is significant. The difference between the reinforced groups is not significant.

The value of reinforcement is therefore shown. The particular value of certain types of reinforcement could not be established.

In Corrective Therapy, reinforcements of the described types may be used to motivate the patient to activities which will eventually aid him in overcoming his difficulties. It will help to get him out of his withdrawn state and in closer touch with reality, after which a more intensive treatment and re-education process may start.

The experiment has also shown the same type of reinforcement could only be used for a limited amount of time. It does not produce better performance indefinitely nor does it secure a high level of performance indefinitely. That means that patients will soon tire of the same phrases and encouragement or of the same explanation.

A variety of reinforcements and a variety of activities preferably from simple to more complex may be the suggested procedure in the process of re-education and readjustment of the neuropsychiatric patients.

[11]Ernest R. Hilgard, Theories of Learning, New York: Appleton-Century-Crofts, Inc., 948, p. 55.

1954 MEMBERSHIP DRIVE

April, May and June have been designated by Les Root, as the period for renewing our efforts in obtaining more Active, Professional and Associate Members

Get application blanks from your Chief of Corrective Therapy or use the one printed in the Journal. Others will be supplied by Les Root,

2142 North 61st St., Wauwatosa, Wisconsin

SEND ALL COMPLETED APPLICATIONS TO HIM AT ABOVE ADDRESS

Every "CT" an Active Member
and
Every Member Get Three:
ONE ACTIVE, ONE PROFESSIONAL AND ONE ASSOCIATE

(A successful drive for '54 is every member's responsibility)

FIFTH ANNUAL SCIENTIFIC
and
CLINICAL CONFERENCE
of the
American Association of Rehabilitation Therapists

August 23 to 27, 1954

WILLARD HOTEL, WASHINGTON, D. C.

(One panel discussion will be devoted exclusively to problems pertaining to CORRECTIVE THERAPY)

A WHEELCHAIR PUSHING DEVICE FOR QUADRIPLEGICS

KENNETH A. DENING*

Persons with partial quadriplegia who have marked degrees of upper extremity weakness often are unable to operate a wheelchair by the usual manipulation of the large drive wheels. In treating a relatively large number of persons with such disabilities, the need for some device to permit propulsion of a wheelchair has been very obvious and outstanding.

A device has been designed and made to satisfy this need. It has been used successfully for over three years with patients who, because of lack of sufficient motion or control of the upper extremities, could not push their chairs with the use of padded gloves or specially adapted wheel rims.

The design is based on the principle that quadriplegics, without active elbow extensors, can perform elbow extension by certain shoulder motions—in this case, horizontal adduction. This is accomplished by fixing the hands or wrists so that they can move only in a certain pathway. For forward motion using this device, the starting position is with the shoulder partly abducted and elbows in partial flexion. As horizontal adduction of the shoulders is carried out, with the hands fixed to move in a line directly forward away from the body, the elbows are forced into extension by the motion of the humerus.

The device has been used, for example, by quadriplegics who have the following characteristic muscle ratings:

Rhomboids	F	Deltoid Anterior	F
Latissimus	O	Medial	F
Teres Major	O	Posterior	O
Pectoralis Major	O-T	Teres Minor	P
Infraspinatus	P	Biceps Brachii	F
		Triceps	O

The wheelchair may be folded in the normal manner without removing the devices. However, both pushing devices can be removed from the chair, if desired, by unscrewing one bolt from each axle. Construction of the pushers is designed to add no more than 2/3 inches total width to the wheelchair.

Slight adduction of the shoulder provides sufficient leverage on the handle of the pusher to produce friction against the tire and the wheel is then rotated by the extension of the elbows. The hands are set in the narrow (bottom) fork of the handle with the thumb on the inside (Fig. 1). It was found that the device worked most efficiently on wheelchairs with the large wheels in the rear. This arrangement provides the best leverage and helps maintain the quadriplegic's balance as he pushes.

Fig. 1. Position for pushing wheelchair forward.

Wheelchairs equipped with this device could be moved backwards rather easily by all patients tested. Backing up is accomplished through bilateral flexion of the elbows with adduction of the shoulders providing the necessary fixation and accompanying friction on the wheels. The narrow part of the forearm, above the wrist joint, is set into the wider portion of the fork, at the top (Fig. 2). The patient releases pressure on the handles by relaxing the shoulder adductors. The counter weight on the bottom of the shaft returns the handle to the upright position ready for another pushing or pulling movement.

In addition to providing a means of wheelchair locomotion for quadriplegic patients, it was found that the device became an excellent development instrument for the shoulder girdle and arms since it was used to some extent whenever the patient sat in the chair throughout the day. It should lead to the more normal method of wheelchair locomotion for quadriplegics—pushing with the palm or heel of the hand—unless the patient has contractures or other

*Corrective Therapist, Physical Medicine and Rehabilitation, Cushing Veterans Administration Hospital, Framingham, Massachusetts.

hand conditions which preclude pushing in the usual manner.

CONSTRUCTION: The handle and upright shaft were made from 1 inch wide strap iron or steel, 3/16ths or 1/4 inch thick. The fork may be welded or brazed to the handle or attached with screws. The fork portion of the handle eliminiates the need for gripping; therefore, the widths of the hand and forearm parts of the fork will have to be determined for each individual patient to provide maximum stability. The handle and fork can then be padded with rubber tubing.

The shaft revolves on a bushing (see diagram) which should have a hole countersunk to receive the head of the 1/4 inch machine screw (length 1 1/4"). The hole in the shaft should be approximately 1/2" in diameter. The shaft may be scaled down to fit wheels of various diameters; the handle part will then remain the same but more counterweight must be added for wheels of smaller diameter.

The axle of the wheelchair must be drilled (7/32 or No. 3) and tapped with a 1/4 inch tap with at least 28 threads to the inch.

Fig. 2. Position for pushing wheelchair backward.

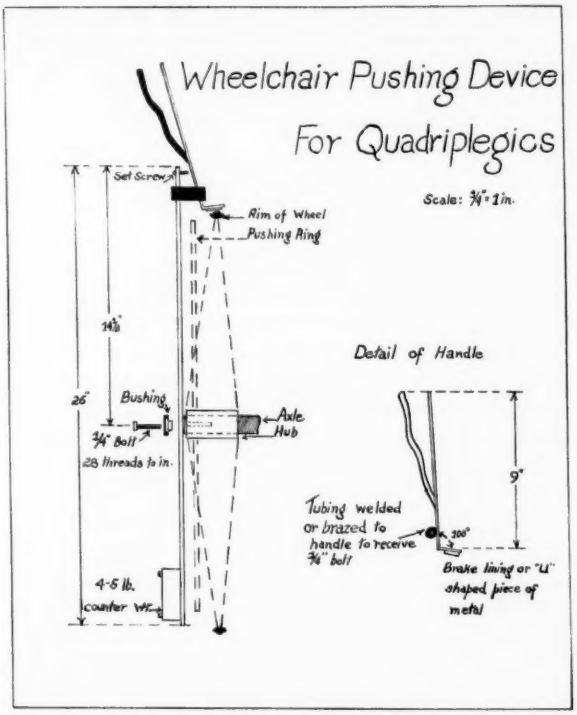


Diagram showing construction.

SUMMARY: A wheelchair pushing device for quadriplegics, who cannot push a standard chair, has been tested and found to provide an adequate means of wheelchair locomotion and an excellent aid in developing the muscles of the shoulder girdle and arms. It can be removed easily and does not interfere with other normal uses of the wheelchair.

Easter Seal Sale

One of the many activities sponsored by

THE NATIONAL SOCIETY FOR CRIPPLED CHILDREN AND ADULTS

has designated the month of APRIL FOR THE 1954 DRIVE

The happiness of many children and adults is dependent upon contributions from this seal sale.

HAVE YOU MADE YOUR PURCHASE?

RESEARCH: A STUDY OF CROSS TRANSFER OF MUSCULAR STRENGTH GAINS DURING RECONDITIONING OF KNEE INJURIES

KARL K. KLEIN, M.A.,* and HARVEY E. WILLIAMS, M.A.**

One of the most recent studies demonstrating the phenomenon of cross transfer strength indicates the necessity of accurately testing and recording the strength gains to the contralateral body part throughout the exercise period. Failure to follow such a procedure may result in premature conclusion of the exercise program before balanced bilateral muscle strength is obtained.

In the application of reconditioning exercises, it is common practice to judge the strength deficiency of the involved part by the strength capacity of the contralateral area and to establish this deficiency as the desirable reconditioning objective for which to strive. Providing no other pathologies exist to modify the medical prescription, the writers feel there is sufficient data reported in the literature to indicate that cross transfer of strength is a factor of importance in establishing ultimate goals of strength return.

The fact that systematic exercise of muscles in one part of the body produces a definite increment of muscle strength in other parts of the body has been common knowledge among psychologists for over half a century,[1] but its general application thus far has been in its use in gathering experimental data and not in its therapeutic application. In this study the primary objectives were threefold: (1) the gathering of experimental data related to the problem, (2) the application of the principles of reconditioning exercise to the involved body part and (3) cross transfer influences of muscle power gains in the bilaterally uninvolved muscle groups.

A total of twelve cases with varying degrees of knee involvement were used in collecting the data. Six of the cases were menisectomies, ranging in postoperative status from six weeks to over a year before the application of the exercise program. Six cases included various types of knee injury which resulted in quadriceps atrophy.

The Oxford Method or English modification of the DeLorme System[2] of heavy resistive exercise was applied as the exercise technique. The program was administered for a period of six to eight weeks to each individual and weekly single maximum lift tests were made to determine the weekly loading procedure.[3] Weekly single maximum tests were also administered to the uninvolved part to determine the strength gains in the unexercised leg. The testing program was administered to each patient following a warm-up period of light resistive exercise before the maximum single lift capacity was recorded.

The following data was compiled as a result of the exercise program indicating the total single lift capacity gains in both the exercised and unexercised limb. (see Table I)

Table I

Improvement Gains Between First and Last Test Administered To the Bilateral Quadriceps Muscle Groups on the Basis o. Single Maximum Lift Capacity

(figures recorded in pounds)

	Exercised Leg				Non Exercised Leg		
Case #	1st Test	Last Test	Ex.Gain	Injury Type	1st Test	Last Test	Ex.Gai
1	R 25	80	55	Menisectomy	L 55	75	20
2	L 80	100	80	"	R 90	100	10
3	L 105	130	25	"	R 120	130	10
4	L 60	125	65	"	R 90	125	35
5	L 40*	67	27	"	R 65	95	30
6	L 80	100	20	"	R 105	105	0
7	R 25	60	35	Injury	L 40	62.5	22.5
8	R 35	75	40	"	L 70	75	5
9	R 30 **	50	20	"	L 60	77.5	17.5
10	R 70	125	55	"	L 90	125	35
11	L 25	75	50	"	R 60	75	15
12	L 45	80	35	"	R 60	75	15
			472				215

* This patient experienced difficulty in terminal extension in the unilateral exercise program. He was removed from this program and placed on bilateral terminal extension resistive exercises.

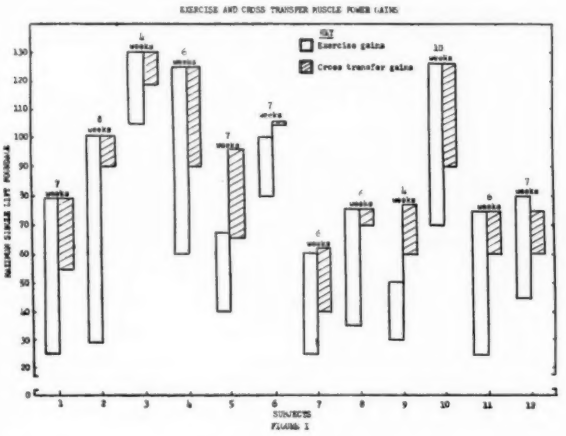
** This patient received an ankle injury that prevented further participation in the program.

The Bar Graph (Figure I) has been drawn to illustrate the individual differences obtained through the exercise period and again emphasizes the need for individual attention in the program admnistration.

Although the small number of cases will not permit a detailed analysis of the methods of measurement used in this study, there is every indication that an attempt to standardize the application of the technique or exercise dosage into a specific method to be applied to all cases is not practical nor advisable. It is the opinion of the writers that this data supports the hypothesis that each case has to be dealt with individually and the individual progress alone

*Assistant Professor of Physical Education, Ithaca College, Ithaca, New York.
**Assistant Professor of Physical Education, San Francisco State College, San Francisco, California

will determine the length of the program leading to recovery with nothing less than a fair degree of balanced strength being the major objective.



From the work achieved by the Andover[4] studies relating to maximum potential power of the quadriceps muscle groups, it is further agreed by the writers that efforts should be made by the therapist to encourage the patient to work toward maximum power, thus assuring the greatest degree of protection to the knee joint. It is necessary that accurate testing methods be adapted for determining the muscle strength whether it be a spring scale, tensiometer or other mechanical device, manual testing is not a valid method for such test procedures. Emphasis should be placed on the testing of terminal extension to insure balanced strength in this phase of extension.

Summary and Conclusions:

The data gained in this reconditioning program again substantiates the findings of F. A. Hillebrandt, W. W. Davis, Slater-Hammel and others regarding the phenomenon of cross transfer (or cross education) of strength to contra-lateral body parts. Periodic muscle tests were made throughout the program with the use of the tensiometer[5] to check bilateral muscle balance. This procedure has been continued and in none of the cases tested, since the completion of the individual programs, has there been any loss of power to either leg. In fact, slight power gains have been made indicating active participation in the normal strenuous activities of the college program.

The amount of cross transfer gain seems to indicate the general condition of the quadriceps of the uninjured leg when the program was started. It appears that those who had the greater initial capacity made less gains by the end of the program. The two exceptions to this were cases No. 4 and No. 10. These two individuals reached bilateral balance at approximately 100 pounds of single lifting capacity but were carried further in the program upon medical recommendation.

The importance and value of periodic testing of both the involved and uninvolved muscle groups have been demonstrated during this experimental period and the authors wish to emphasize the values of this procedure, particularly in problems dealing with muscle groups of ambulation.

Recommendations for Further Study:

Although considerable research has been conducted in this area, the writers feel that additional study should be conducted in an effort to:

1. Further substantiate the value of the increased "weekly goal level" as it influences the program being administered;
2. Further study of the relationship of the tensiometer measures of muscle strength to actual weight resistance load strength; and
3. Develop a method of tensiometer muscle measurement to determine terminal extension muscle power gains in quadriceps restoration.

BIBLIOGRAPHY

1. Slater—Hammel, A. T., "Transfer of Exercise as a Therapeutic Tool," *Journal of the Association for Physical and Mental Rehabilitation*, April-May 1951.
2. Zinovieff, "Heavy Resistive Exercise The Oxford Technique," *The British Medical Journal*, 14:129-132 June 1951. Reprint *Journal for Physical and Mental Rehabilitation*, p. 23, Jan. 1952.
3. Klein, K. K. and Johnson, E., Research: "A Method of Determining the Maximum Load, for Ten Repetitions in Progressive Exercise for Quadriceps Hypertrophy," *Journal for Physical and Mental Rehabilitation*, June 1953.
4. Delorme, T. L., *Progressive Resistive Exercise*. Appleton Century Crofts, Inc., New York, New York. 1950.
5. Clarke, H. H., "Objective Strength Tests of Affected Muscle Groups Involved in Orthopedic Disabilities," *Research Quarterly* AAHPER May 1948, Vol. 19, No. 4, p. 118-47.

"A niche of usefulness and self-respect exists for every man and woman, however handicapped; but that niche must be found for him. To restore him and with him the future of our countries, that is the sacred work." JOHN GALSWORTHY

SOME EVOLVING WORKING RELATIONSHIPS BETWEEN PSYCHOLOGY AND CORRECTIVE THERAPY*

JOHN EISELE DAVIS, Sc.D.**

In the picture we have just seen, the Corrective Therapist finds himself in a dynamic situation as he begins to feel the interplay of strong forces converging upon the behavior of the patient. *Strange* things are happening to any preconceived ideas he may harbor as to the *conventional* physical educational approach. He finds himself in the position of being exposed to a *new* perspective. He begins to realize that a more careful appreciation of the *emotional* reactions of the patient is fundamental to an understanding of what is going on. On a purely empirical basis, he begins to progress from the conventional recreation approach to the more precise discipline of the therapist. In daily contacts with Robert Scott, the patient, he grows more sensitive to the *psychological* component in its effect upon illnes as well as health. He begins to realize the significance of Karl Menninger's explanation: "The thoughts, the emotions, the behavior of the individual, must be considered part of him no less than his flesh and bones and be capable of a pathology for which medical diagnosis and treatment are necessary, available and effective."

Red Barry, the Corrective Therapist, finds himself in an arena where the elemental instinctive drives of the individual break through the illness and seek expression. He has a force, which while he little understands its nature, he feels his great potentials. Through the guidance of the psychiatrist he is given a rationale of approach in which the distinctive tools at his command, exercise, activity, words, people, are all brought into play. At the beginning he finds the sensory level provides the best avenue of approach since the patient can express himself more easily and naturally at this level. The response, in terms of active participation, is likely to be most spontaneous. Activating the patient's participation and directing it into constructive therapeutic channels, however, do not necessarily follow in logical sequence. Red Barry discovered an important corollary of therapy; namely, that since activity provides such a facile language for the mental patient he, the patient, may use it to express his illness rather than to cure it, to protect or project his fantasy rather than to change it. People under the excitement of the play activity begin to take the form of personalities in which temperament and attitude emerge to differentiate them from one another and more significantly from the non-animate objects typified by the baseball bat. In fact these tools become little more than athletic paraphernalia. The Corrective Therapist begins to sense the social power of the rich symbolism being generated in this situation in which profoundly ill people are able to use these objects to express themselves as they engage in the elemental forms of the group experience.

This actual and potential social situation becomes increasingly complex as these various elements—play and exercise paraphernalia, people and personalities —are brought into this milieu. Whereas in the beginning the activity therapist was concerned primarily with action, he now becomes concerned with *reaction* and *interaction*, as a trinity forming the therapeutic process. Under the instruction and direction of the psychiatrist he begins to see the dim outlines of a structure of therapy, a framework upon which he can organize his special training and talents under a specific plan of operation. At this stage he becomes acutely conscious of a need for a synthesis of all these component parts into a total structure of treatment, some way of getting together under this more precisely structured companionship effort. Red Barry, as a Corrective Therapist, heartily subscribes to the concept of the team approach in its administrative aspects under medical direction. He is now concerned with the medical implementation of these various facets into a system of treatment which is practical, progressive,. and dynamic.

Red Barry is in the strategic position of a learner. He is happy with the opportunity to exercise his intellectual curiosity and interest in a consideration of the psychological component of complete treatment which, of course, includes rehabilitation. He wants to learn from the psychiatrist, the neurologist, the psychologist and other members of the adjunctive therapy groups. He wants to know more about himself. For the purpose of this discussion, however, we will confine our remarks to the working relationship evolving between psychology and corrective therapy.

What are some of the ways in which the corrective therapy *can* benefit from psychological services and, secondly, what can the activity phases conducted by corrective therapy contribute to the *effectiveness* of the psychologist in the dynamic areas of rehabilitation as well as definitive treatment?

Realizing, in words of Adolf Meyer, that the patient

*Presented at the Convention of the Association for Physical and Mental Rehabilitation, Memphis, Tenn., following the showing of the Corrective Therapy Film, "Activity for Schizophrenia."

**Chief, Corrective Therapy, PMRS, Central Office, Washington, D.C.

can tell in his activity what he can not tell in the formal interview, the psychologist can assist the corrective therapist to generate a free activity atmosphere in which the patient can express himself easily and naturally. In sheer physical abandon some patients can express the gross aspect of their behavior while others, in small body movements, may demonstrate resistances and inhibitions. The psychologist can assist the patient's understanding of himself by giving the patient clues as to what he is saying in his activity.

As Doctor Gregory Zilboorg informs us the therapist can not cure the patient. He can only provide the circumstances and conditions in which the curative process may begin and proceed.

In this framework the psychologist can assist by telling the therapist more about the patient's reaction to his specific illness, what he is trying to *accomplish* by his illness, the *defenses* he is setting up by his unique construction of symptoms, the patient's *resistance,* the forces he may be generating to *counteract* the planned therapy. He can give the therapist *specific* information as to the over-all plan of therapeutic attack.

The psychologist can assist the therapist by instruction in the compilation of clinical data and improved methods of communication. He can assist the therapist in preparing *meaningful* observational reports and progress evaluations.

On the other hand the Corrective Therapist may assist the psychologist by awakening the patient's interest in *planned* activity and, once the patient spontaneously participates, providing a more *labile* situation in which the psychologist is able to meet the patient and obtain his cooperation on a more workable level. On the basis of the interest to effort theories, the psychologist is able to test the patient's actual and potential interests and communicate this information to the therapist.

The Corrective Therapist's skill and training in activity techniques affords approaches to the patient upon various other non-verbal levels which can be utilized by the psychologist in both theory and practice. Time does not permit a discussion at this point of the recognized important relationships between active corrective therapy, and the projective techniques in the theoretical explorations of the areas of communication as commented upon by Doctor Hildreth.

It is a well known fact that in treatment practice just about all the elements of the psychotherapeutic process are modified to meet the various levels of capacity and interest, except the *activities* themselves. The Corrective Therapist, by the very nature of his discipline and the area in which he works his activity tools and the personalities with whom he deals, becomes adept in the modification of activities to meet various levels of capacity and interest to meet specific therapeutic aims. He is in a strategic position to bring this information to many others including the psychologist for whatever use he may be able to make of it.

Finaly, in this motivated new world of activity and verbalization, both the psychologist and the Corrective Therapist will, in my opinion, sense the need for new words to describe these new concepts, new experiences and horizons, in addition to the dynamics of behavior. New items listing descriptive adjectives, dynamic verbs and revealing nouns may well usher in a new era of theory and practice, such an area as Krapelin and Freud contributed to psychiatric concepts. I believe it is well recognized today that a *new science* of semantics is fundamental to the development of this fertile field of action and inquiry.

These are but few of the evolving relationships one is able to visualize in our hospitals where dynamic programs of activity are coming into contact with the precise methodology of psychology. It is realized that this is an evolving relationship, there are no static formulations here, the book is not closed. As both psychology and Corrective Therapy experience professional growth, new areas will unfold. As the research explorations of psychology expand into the rich fields of activity therapy, new vistas will meet the eye and mind, and it is conceivable that many new facts will be discovered and old fallacies abandoned. It is evident that these progressive disciplines have much to offer to each other in a close liaison of medical treatment vitalized by modern concepts of rehabilitation and a sincere desire born of their mutual experiences for intra-disciplinary understanding and support.

PATRONIZE YOUR ADVERTISERS—THEIR PURCHASE OF SPACE IN THE JOURNAL ACQUAINTS OUR MEMBERSHIP WITH THE BEST. **(See the Directory, page 68)**

AN EXPLORATORY TRAINING TECHNIQUE USING RELAXATION AND BREATHING EXERCISES AS AN ADJUNCT IN TREATMENT FOR DIGESTIVE ULCER CASES

EARL W. MASON, M.A.*

A great many medical authorities think that nervous strain is a directly contributing cause to digestive ulcers. Some think that the ulcers are the cause for the nervous tension usually found in these cases. Regardless of which it may be, extreme nervous tension is present in most digestive ulcer patients and they are generally irritable and negativistic.

Relaxation has proven of great value in relieving such tension and breathing exercises have proven of value as tonic therapy where activty has been extremely limited. To obtain maximum results from instruction it is felt that treatment periods should continue at least for two weeks. Some persons respond more readily than others and the range varies from ten to twenty instruction periods. Maximum benefits, as treatment from relaxation, should continue indefinitely when and if the procedure can be successfully followed.

The Digestive Ulcer patient is referred by the Chief of Physical Medicine Rehabilitation with a prescription for Relaxaton, Relaxation Training, and Breathing Exercises.

This treatment and instruction is given to each on an individual basis with specific attention to the needs encountered.

The purpose is not for immediate treatment benefits only but also for instruction resulting ultimately in the patient being able to follow the procedure and obtaining the benefits for himself. It is given daily to each as are the Breathing Exercises. Breathing exercises are thought to be of great benefit as part of the relaxation procedure as well as of value for tonic therapy also.

The procedure on an individual basis is much the same as that described by the writer in a previous article on Group Relaxation.[1]

1. Be sure the person is in a most comfortable position using a broad, padded surface not allowing too much sag of the body. Where excessive tension is noted from too much weight or strain in certain areas use soft towels, infant pillows, or other pillows to bolster the weight or relieve strain. Instruct the person to let the body "sink," "down and through" the mattress. At intervals stress this by encouraging them to breathe deeply and "sink," letting the weight of the head lay back, the shoulders slump, the hips sag, and the legs lay loosely.

2. Muscular tension is often relieved by passive movements and emphasis on relaxation of parts with exceeding tension, such movements giving particular attention to what might be referred to as "hinge areas." This is similar to what Paul Roland[2] calls a relaxation response technique. These "hinge areas" might be listed as the jaws, neck, shoulder girdle and spine, shoulder, elbow, and wrist joints, where the spine and pelvis join, hip, knee, and ankle joints. Where the ribs join the spine and sternum also form a hinge joint which moves with breathing exercises.

3. An awareness of the difference between muscular tension and relaxation must be established to obtain successful results. Muscle setting and emphasis on relaxation following the movements are one of the means for developing such awareness. Particular attention is given to parts showing the most tension and manipulation of rigid muscles sometimes helps to overcome it. Other exercises should be given as they meet the persons needs and can include; raising and turning the head, setting of the face and neck muscles, shoulder elevation and shrubs, trunk raising or lowering, back arches, pelvic tilts, hip shrugs, buttock squeezes, hip and leg rotation, muscle setting of the whole body, straight arm raising and lowering, elbow flexion and extension. Movements should be performed slowly and with the muscles set for a few seconds each time before relaxing them.

4. Breathing exercises help to relieve restricted breathing habits usually accompanying nervous tension. It is felt that such restriction interferes with respiratory and circulatory efficiency needed in these cases. Such breathing seems to bring about an involuntary relief of tension, generally. It is difficult to tighten the muscles of the body during the process of deep breathing and extremely so toward the finish of the expiration. Deep and regular breathing may also simulate conditions of sleep and effect some of the same physiological benefits. Breathing exercises, performed as tonic therapy, are followed by many signs that organic and systemic efficiency are increased. This

*Chief, Corrective Therapy, Louisville V.A.H., Louisville, Kentucky.

1. Mason, Earl W. and Koski, Edward Z. Jr., *An Exploratory Training Technique Using A Group Procedure For Relaxation.* Journal of Assoc. for Physical and Mental Rehab., Aug. 1949.

2. Paul Roland, *An Exploratory Training Technique For The Re-Education Of Catatonics,* Jr. A.P.M.R., Aug. 1949.

increase possibly contributes to resumption of normal processes throughout the body and aids in relaxation as a natural consequence.

5. The relief of muscular tension itself is not enough and it will return if the patient does not also overcome the mental tension to a satisfactory degree. This seems to be because tension is involuntary and apparently semi-conscious in these persons. To aid in relieving this mental tension they should be instructed to attempt to remove the thoughts from the body and immediate presence to those far away. Thouhts should be of a warm climatic nature, of pleasant vacation events, scenes involving bright colors such as green grass, white, red, blue, yellow, or other brightly colored flowers in large quantities, blue skies and lakes, expanses of sandy beaches, fishing trips, picnics, and other scenes, which will take the thoughts from anxieties or worry about one's self or family.

Too often anxiety and worry become a habit with persons and, when they could and should be resting, tension and strain continue. Suggestion and psychological assurance given by the therapist during the course of instruction and procedure of relaxation aid in relieving strain and breaking the habit.

On initial contact by the therapist, the patients with digestive ulcers are found to be more negativistic and show more hostility than other types. Changes in temperament soon become apparent and antagonism decreases progressively, negativism and hostility become minimal or subside, nervous tension decreases, and muscular rigidity is lessened. Chest expansion is increased, breathing is deeper, more regular, and less abdominal in nature. In general, coloring of the skin becomes more normal, nervous habits, movements, and tics subside or are negligible. Complaints of pain, usually in the abdominal area, decrease or subside. Patients relate they are able to go to sleep quicker and sleep longer and sounder with insomnia or other broken sleep disappearing.

Most patients state after receiving instruction, that when they lie down they think of the directions they have received and are usually able to apply them satisfactorily by themselves as an aid to sleep, rest, or relaxation.

In conclusion, it might be said that this procedure has been used in this situation for almost five years and repeated evaluations made. The fact that other medical treatment was given at the same time makes evaluation difficult but observations indicate conclusive aid toward relief of the symptoms or attendant conditions causing or accompanying digestive ulcers.

It has been generally agreed that Relaxation and Breathing Exercises do contribute to some degree as an adjunct to treatment of these cases. Mental and muscular tension and strain decrease or subside, nervous habits or tics decrease or are no longer evidenced, and there are indications of increased systemic efficiency, especially in the respiratory, circulatory, and digestive and excretory systems.

WORKING WITH NEUROLOGICAL PATIENTS THROUGH CORRECTIVE THERAPY

LEO BERNER*

We all recognize the problem of treatment for the patient with the neurological disabilities is a vital and ever increasing one, in our present day society. The impact of World War II, the Korean War; the growing recognition of the need for geriatric medicine because of an increasing life span among our population, are a few of the factors that have compelled us to re-examine our contribution to the treatment of the neurological patient.

Today medical rehabilitation is a basic treatment component in the medical procedures that are utilized for encouraging recovery and adjustment of the patient. In fact, I think that we can safely say that the development of rehabilitation programs for neurological patients have opened new vistas for both patient and medical science. This philosophy of medical rehabilitation which regards not only the disability itself, but the approach to the total personality as well as the social situation in which he must function has done a great deal to restore the dignity and respect that rightfully belongs to all human beings in a democratic society. Bernard Baruch, our famous elder statesman and a man extremely interested in the progress of Physical Medicine and Rehabilitation, neatly characterized the philosophy which guides the work of rehabilitation specialists today, when he stated—"there is no such thing as a human scrap-heap." Today we can expect a great many of the neurological patients to become socially useful and productive citizens. For those who are so seriously disabled, that we cannot achieve this objective, we can expect them to improve to the point where they become better hospital citizens and happier adjusted individuals.

*Chief, Corrective Therapy, VA Hospital, Bronx, New York.

Within this context Corrective Therapy plays a strategic role in the rehabilitation of the neurological patient. Before I describe specifically what it is that the Corrective Therapist does for the neurological patient, let me give you a brief overview of the total rehabilitation process. Many of these principles, I know are quite familiar to you, but they bear repeating to reinforce constantly the cherished goals that we seek to attain. First and foremost we must accept the fact that the rehabilitation of the neurological patient begins the moment that the paient is stricken by injury or disease and the process is a continuous one until the man is successfully adjusted into the community. I cannot overemphasize this point because it is not inconceivable that the rehabilitation of the patient can be either facilitated or inhibited at any step of the rehabilitation process. Let me give you a couple of examples to illustrate what I mean. A patient who had received a traumatic brain injury resulting in a left hemiplegia during the Saint Lo campaign in France, during World War II, had been in a coma at the field hospital for several days. During that time he underwent emergency brain surgery. When he emerged from his coma the first person to greet him was the neurosurgeon who had carried out the operation. The surgeon leaned over gently, and in a soft spoken voice said to the patient, "You are going to get well." At this moment, the patient's rehabilitation processes had begun in a positive direction, and the goal to which we all strive was firmly implanted in the patient's mind. Simple as those words may seem, they were critical ones, because the patient actually emerges into a new world, a confusing world, where trauma is not only of an organic nature but also a psychological one. And where assurance must be tactfully given so the patient will receive whole-hearted support medically, socially and emotionally. Later when this particular patient had been returned to the States and had improved sufficiently so that he could be assigned to the Corrective Therapy clinic, this same spirit was enthusiastically displayed by the Corrective Therapists. I remember distinctly the day when the patient was told that bed exercises had conditioned him sufficiently so that he was now ready for his ambulation training. The first few steps that he took were charged with tension and apprehension, so much so that he had lost his balance and pulled the Corrective Therapist down to the floor with him. The patient looked up with a shameful and despondent expression on his face. At that moment someone yelled, "Timber," everybody laughed, the patient laughed, and another critical stage in the rehabilitation process had been passed. I think that these examples illustrate quite clearly that the treatment of the neurological patient represents a most complex problem, and we must be prepared as Corrective Therapists to deal not only with the physical rehabilitation of the patient, but also the various psychological and social pressures that may arise during the treatment process. Here also is illustrated quite clearly, I believe, the importance and the need for the Corrective Therapy program to be integrated into the total treatment process in a purposeful manner. The Corrective Therapist must have not only a thorough knowledge of his own field and skill of the application of this knowledge, but he must also be cognizant of what others in the rehabilitation team are doing for the patient. This is the only direct route towards gearing the patient to a happier and more useful life.

It is important to emphasize at this point that the rehabilitation process does not take hold in full dynamic fashion until the patient is ready to accept the responsibility for his own rehablitaton. In other words, the patient himself is the pivotal member of the rehabilitation team, and therapy is done with the patient and not for the patient. Thus a basic skill required by the Corrective Therapist is the ability to motivate the patient so that we can secure his full cooperation in his rehabilitation.

The Corrective Therapist plays a dominant role throughout the duration of the rehabilitation process. In the beginning the Corrective Therapist is usually one of the first persons assigned to the patient. Here his primary tasks are to establish confidence in the patient so that he will trust the therapist and will have faith in himself and his ability to improve his conditon. Neurological patients after all are usually seriously disabled patients. They have a tremendous functional adjustment to make and it is not difficult to realize why a patient who has been incapacitated by a neurological injury or disease may develop a feeling of futility regarding his future. The quicker we establish this kind of rapport between patient and therapist the easier it will be for the therapist to follow through on Exercise Therapy treatment procedures.

After all we still must face the inscrutable fact that the patient must be physically conditioned for the rigorous rehabilitation regime to follow. As the patient improves and moves along the rehabilitation road, the role of Corrective Therapy changes and adapts itself to the needs of the patient continually. At this point the Corrective Therapist must be concerned not only with the maintenance of the psychological and physical condition of the patient, but he must now institute exercise therapy procedures which will enhance the medically prescribed rehabilitation objective, which may be either that of a better hospital citizen, a happier home-bound indi-

(Continued on Page 63)

"From Other Journals"

HANS KRAUS, M.D., and RUTH P. HIRSCHLAND, "Muscular Fitness and Health," *Journal of the American Association for Health, Physical Education, and Recreation*. 24:10, pp 17-19, Dec. 1953.

Here is an article filled with evidence of the importance of muscular fitness as necessary for optimum health.

Tests for elasticity and power were given 1,987 school children in Austria and Italy, 4,458 normal healthy school children in suburban America between the ages of 6 and 19 were tested. The incidence of failure, or the total number of the 13 tests which these normal healthy children failed, was 78.3%. This meant that 16.4% of the group were failing two or more tests. With the children of the same age tested in Austria and Italy, a better showing was made. These tests are the same tests used on muscularly deficient backache sufferers.

The authors conclude that "insufficient exercise may cause the dropping of muscle efficiency levels below that minimum necessary to daily living. The same lack of exercise may cause inadequate outlet for nervous tension. Lack of sufficient exercise, constitutes a serious deficiency comparable with vitamin deficiency. Prevention of this deficiency is an urgent need." The authors believe further research will be necessary to complete and broaden their preliminary survey and to show the geographical encidence of under-exercise in this country.

Such a test of elasticity of back muscles and hamstrings; the upper and lower abdominal muscles, and the abdominals with the iliopsoas eliminated, with tests of the power of the upper and lower back as well, could well form an important preliminary to the health maintenance aspect of the reconditioning programs, now operating in our hospitals, rehabilitation centers, schools and colleges. This is an article of significance, because of its stimulating implications and scientific approach to a situation presenting a challenge.

MORRIS T. FRIEDELL, "Effect of Cigarette Smoke on the Peripheral Vascular System," *The Journal of the American Medical Association*, 152:897-900, July 4, 1953.

After injection of radioactive iodinated human serum, a scintillating counter sensitive to gamma radiation will reflect the change in blood volume in a cross section of a measured area. Fifty-two men and 48 women were tested by measuring the circulation in the hand before and after smoking two-thirds of a cigarette in four minutes. The maximum degree of reduction in blood volume in sensiitve men averaged 19%; in women, 33%. One person out of five showed no response, presumably due to not inhaling. When filtered cigarettes were used, one out of three showed no response. The maximum response occurred from 8 to 10 minutes after beginning to smoke. In general, men recovered more quickly than women. It is felt that women have a much more labile peripheral vascular system. Many older patients showed little or no vasoconstrictive effect from smoking.

PJR

RICHARD E. McGOVERN and HAROLD B. LUSCOMBE, "Useful Modifications of Progressive Resistive Exercise Technique," *Archives of Physical Medicine and Rehabilitation*, XXXIV:473-477, August, 1953.

With the full utilization of the DeLorme System of Progressive Resistive Exercise in a large busy clinic, time consumption by the therapist becomes a very important factor. Another need for modification is that patients with poliomyelitis fatigue rapidly and cannot complete the routine of 30 repetitions. This phenomena is apparently unrelated to the strength of the muscles involved and seems due to a lower "fatigue threshold."

Patient treatment time was decreased in the sub-maximal range to 5 repetitions at one-half the 10 repetition maximum. This makes the premaximal exercise only a "warm-up," while the *therapeutic* portion of the exercise is at maximal levels. Since many hold that only over-load exercise produces hypertrophy, elimination of the sub-maximal repetitions should produce no great change in the end results.

A second modification is to have a "warm-up" of unresisted active exercise followed by lifting the 10 repetition maximum 10 times. After a rest period of 1 minute 3/4 of the 10 repetition maximum is lifted for 10 repetitions. After another 1 minute rest, there is a final group of 10 repetitions at one-half the 10 repetition maximum. By progressively decreasing the load, a normal fatigue curve is followed.

PJR

JACQUES M. MAY, "The Geography of Human Disease," *Office of Naval Research, Research Reviews*, October, 1953, pp. 7-11.

Disease may be viewed as a phenomenon arising from the great conflict which the fact of living among other organized living things brings about. Disease may be classified as degenerative and transmissible. Environmental factors in disease include physical, cultural and biological factors. In studying the ecology of human diseases, the first step is to discover the actual occurrence of disease and plot it on maps. Then we can study the ecological factors prevailing in the region to see whether these factors are common to various places of occurrence. A third step might be the study of the correlation that exists between the agents of disease themselves. It is apparent that certain agents attenuate or reinforce each other from the point of view of their aggressiveness towards man. This has been studied in the laboratory, but nothing is known as to what goes on in nature.

PJR

L. VON BERTALANFFY and R. R. ESTWICK, "Tissue Respiration of Musculature in Relation to Body Size," *American Journal of Physiology*, 173:58-60, April, 1953.

The relation between metabolism and size, as expressed in the decrease of weight-specific basal metabolic rates with increasing body size is well known, but none of the explanations given for this phenomena are satisfactory. Experiments with skeletal muscle of rats *in vitro* give no indication that differences in muscular consumption of oxygen play a decisive role in the regulation of basal metabolic rates according to body size.

PJR

K. S. LION, "Research Methodology," *Archives of Physical Medicine and Rehabilitation*, XXXIV:217-224, April, 1953.

The goal of scientific research in the natural sciences is to discover the structure or behavior of a natural object or the rules and laws that govern a natural phenomenon or a natural process. On the basis of a logical science, every single phenomenon can be explained by a limited or a small number of general laws. Any research in the fields of biology and medicine seems to represent a more valuable contribution the more it uses the elementary concepts of physics and chemistry. Some of the representative trends in the present development of methodology in medical research include the digital computer, the analogue computer, the electronic amplifier, the transistor, the cathode follower, the transductors and analogies in complex systems.

BOZO SKERLY, "Thigh Girth as a Means for Evaluation of Nutritional Status," *Human Biology*, 25:28-31, February, 1953.

The technique of measuring circumferences to evaluate the nutritional status of a person is simple and fairly satisfactory. In males chest girth measured just below the axillae and above the nipples has the highest correlation with stature and thigh girth the lowest. In females, waist girth has the lowest correlation. In both sexes chest girth has the lowest corrolation with weight; thigh girth the highest. The upper arm and the thigh girths seem the best simple anthropometric measures to appraise individual nutritional status.

PJR

S. A. WEISMAN, "Track Stars are not Barrel Chested," *The Journal Lancet*, 73:280-282, July, 1953.

Measurements of over 20,000 chests indicate that the tuberculous chest is narrower and deeper than the normal adult chest. Frequent reference by sports writers to track stars being "barrel chested" and "deep chested" led to the measurement of a number of stars who participated in the NCAA championships in 1940 and again in 1949. These measurements indicate that with few exceptions track stars have flat, wide chests. A study is now being conducted to determine whether a relationship exists between thoracic contour and cardiac size.

PJR

Editorials

NEW METHODS FOR HANDLING PSYCHONEUROSES

The pace of contemporary life is a contributing factor to the increasing number of maladjusted men and women suffering from various forms of psychoneuroses. To meet this increasing problem of reduced health and efficiency and bring before the public new forms of mental therapy and research, NEWSWEEK magazine has given a very informative and encouraging description of the Austen Riggs Center Inc., Stockbridge, Mass.

This informative article entitled—"Riggs: A Winning Fight on Nervous Breakdowns," appearing in the issue of the week of November 30th, presents a new and dynamic attack on the problem, even though this center has been developing for 35 years. The basic philosophy of the originator is well summed up in the reaction of one of the patients.

"Everything is so different than I though it would be. I expected to go to bed in a sort of sanitarium . . . Imagine my surprise when I drove through a beautiful countryside to a fine old house to be ushered into a charming room and told to dress for dinner." She was equally surprised to find a notice on her nightstand: *"Your responsibility is not to discuss medical matters with other patients, and also to refuse to allow other patients to do so with you."*

The article brings out the point that much of the basic philosophy of Austen Riggs permeates the modern Stockbridge institution, a nationally known teaching, treatment and research institution. Since 1947 Dr. Robert P. Knight, formerly chief of staff at the Menninger Foundation at Topeka, Kansas presented the newer concepts of treatment, when he states: "If the patient's emotional balance control is precarious and his reserve ego strength depleted, we do not put him on a couch and try to analyze his dreams, we sit him before us face to face and give him advice, encouragement, and a prescription for daily activities." If on the other hand the patient is strong enough to withstand investigation of his unconscious processes, Dr. Knight would feel safe in further investigating his trouble through psychoanalysis. Fewer than 20% of the 41 Riggs patients are under full analysis. Today, treatment at Riggs Center is conducted in a pleasant, unrestricted manner.

The basic philosophy of the center seems well summarized in the following:

To Keep On An Even Keel

DO ONE THING AT A TIME; only thus can you practice concentration.

MAKE CLEAN CUT DECISIONS; when something has to be done, waste no time getting up steam to do it.

KEEP WORK, PLAY, REST AND EXERCISE in their proper relative proportions.

DO NOT ACCEPT HURRY as a necessary part of modern life. Quality of work spells success, and quality is destroyed by hurry.

WORRY is a complete circle of inefficient thought, whirling about on a pivot of fear.

In corrective therapy, where wholesome physical activity constitutes the bulk of the treatment, it is essential that the therapist know the patient. The first step in working with a patient is to establish a relationship with him. As the patient has faith in you, he will undertake many things that he would not otherwise have courage to try. He can comply with rules if he feels that his therapist believes in the rules. He is cooperative or can be cooperative if he feels this will be acceptable to the therapist. His ability to accept his losses as well as his gains is also related to what attitude the therapist has toward winning and losing.

The range of his behavior patterns will depend upon the patient's experience, the degree of his present incapacity and his recognition that changes can be made. There should be opportunities for patients to make decisons. This again, is something we must recognize as a step in progress and there are still patients who are sent to corrective therapy clinics who are unable to make any kind of decisions.

Activities can be selected which are a revival of old experiences as well as development of new experiences and skills. This does put the burden on the therapist to constantly evaluate the patient's state of progress and be ready to provide activity which will be meaningful and help in the patient's readjustment.

In other words, a tremendous burden is placed upon the corrective therapist and he must know more than activities. He must know human beings, the psychology and physiology of their behavior, in order to be an effective therapist.

RESEARCH

Editor's Note: This is the second in a series of three hypothetical conversations between an inquiring Corrective Therapist and a "research counselor."

PART II—METHODS OF STATING THE PROBLEM AND DESIGNING THE EXPERIMENT

Q. *In setting up a research project, is it necessary to state the problem in some standardized form?*

A. It is not as important that the problem be stated in a particular form as it is that the problem be stated. By stating the problem we mean essentially the formation of a question or problem about which we currently have uncertain, incomplete, or perhaps contradictory information. If we can specify as clearly as possible the specific area in which we want the additonal information—and why—we are well on our way toward the first steps in a research project. It is desirable that the problem grow out of the existing body of knowledge so that whatever results are procured can then be applied more directly to a currently held way of looking at a particular problem or area of behavior or pathology. For example, maybe a recent article has pointed up a previously unobserved relationship between certain conditons, but this relationship has not yet been clearly established. A good piece of research would be to "follow up" any leads suggested by the parent study.

Q. *What is involved in stating a research problem? And, what are some of the accepted methods for setting up the experimental design?*

A. Usually we should first think in terms of the broader frame of reference in which the more specific question or problem is to be ordered—that is, a more general theory in which our specific problem can either be stated in terms of a specific hypothesis or "guess" as to outcome, or it can be stated in terms of a simple question about any relationships which may exist as a result of subsequent analysis the results of the study. The sole purpose of the experimental design is to set up the most practical and scientifically sound set of operations that can be employed to investigate the question at hand. This phase primarily involves setting up the *procedure* which would include a consideration of the *subjects* to be used, the *apparatus,* if any, that may be involved, and the actual *method* to be employed in the conduct of the experimental design may require the use of two types of groups of subjects (or patients)—the *experimental* and the *control.* The experimental group may be subjected to systematic variations in the particular variables or factors under consideration, while the control group is systematically held constant in these factors, thereby permitting a more meaningful picture of the role of the variables in the final behavior in the two groups.

To make more concrete and meaningful some of these rather abstract considerations, I would recommend that anyone interested in conducting research study closely some articles chosen at random in scientific journals having high standards for research competence. It would be better to study these articles only in terms of the *approach* to the problem rather than the content. How clearly, for instance, is the problem indicated early in the body of the text, and how explicit and internally coherent is the experimental design. Your medical librarian may be able to help you with suggestions of journals to peruse. Certainly journals published by any of the medical, psychiatric, or psychological national associations would be good starting points.

WORDS OF WISDOM

What's the use of healing a man's body and mind if you leave him sick at heart? —Anonymous

It is more important to know what kind of a man has the disease, than to know what kind of a disease the man has. —Dr. Shattuck

It is often surprising to find that heights may be attained merely by remaining on the level. —Sunshine Magazine

Why worry about things you can't control? Get busy controlling the things that depend on you.

You can't control the other fellow's opportunities.

Book Reviews

THE MACHINERY OF THE BODY, by Arthur J. Carlson and Victor Johnson, Chicago: The University of Chicago Press, 1953. 663 pp. $5.50.

The Machinery of the Body is designed for college level students who have had no previous training in the biological sciences. As the present printing is the Fourth Edition, it is evident that it has gained acceptance as a standard text for elementary courses in physiology. Certainly the ability of the authors to explain their subject with a minimum of technical terminology is one of its outstanding features. In the present revision the material is "as new as tomorrow," as a current advertising slogan expresses it. The effect on the body of radiation from atomic bombs, the use of the gamma globulin in immunizing against poliomyelitis, and the use of radioactive chemicals are a few of the recent advances which are discussed. The sections on alcohol and tobacco are noteworthy for their judicious appraisal of the evidence. Fanatics of either persuasion will take little comfort from the author's dispassionate examination of the few known facts. Sufficient discussion of abnormal conditions, such as the Rh factor, hypertension, diabetes, goiter and similar subjects is given to inform the student of the problems involved without raising morbid fears. The book is profusely illustrated, but the shortness of the bibliography is somewhat surprising. Only 22 items are listed, and some of these are of a rather general nature. Recent research has cast doubt on the concepts of the Bainbridge reflex, muscle tonus and reciprocal innervation. No recognition of this appears in the text. However, within the limits of its frame of reference *The Machinery of the Body* should prove generally satisfactory.

PJR

MUSIC AND YOUR EMOTION, by Emil A. Gutheil, et al. New York: Liveright Publishing Corp., 1952. 128 pp. $2.00 (Paper)

The value of music as a psychotherapeutic agent is being studied by the Music Research Foundation Inc., at the Walter Reed General Hospital, Washington, D. C. The book *Music and Your Emotions* sets forth their findings over a three and one-half year period, and emphasizes the need for further scientific investigation in this field.

In the words of Emil A. Gutheil, who wrote the introduction, "This book atempts to do three things: (1) to introduce the reader to the broad problem of the relationship of music to emotions; (2) tooutline the scientist's guest for a suitable approach to the problem; and (3) to present the results of two major studies designed to relate mood changes to particular musical stimuli."

A practical list of musical selections that are most apt to create a desired mood in the listener is included in the book and should be of great value to those interested in Music Therapy. The results attained in case studies utilizing the above material have thus far been favorable.

CPS

MANAGING YOUR CORONARY, by William A. Brams, Philadelphia: J. B. Lippincott Company, 1953. 158 pp. $2.95.

Dr. Brams, a heart specialist now at Michael Reese Hospital, Chicago, has writen an excellent volume for the layman who has, or who fears he has, "heart trouble." Dr. Brams discusses the diagnosis of coronary thrombosis, with due warning against the dangers of self-diagnosis, how the heart works, treatment of an attack and rehabilitation afterwards. He frankly admits that the fundamental problem of how to stop hardening of the arteries and restore them to their normal condition is unsolved, but throughout the book he emphasizes the hopeful aspects. Fear, he tells us, is the average man's greatest foe. The individual who has had a heart atack is more apt to be crippled by his own anxiety than by damage done to the heart. He should live life just as fully as he is able, and about 50% of such patients are able to resume their normal programs. The text is considerably enlivened by illustrations drawn by Hertha Furth. It is unhesitatingly recommended to any layman concerned about his own cardiac condition or that of his relatives.

PJR

BODY TEMPERATURE, ITS CHANGES WITH ENVIRONMENT, DISEASE AND THERAPY, by W. A. Selle, Springfield: Charles C. Thomas, 1952. 110 pp. $3.50 (Levide)

In this book Dr. Selle has reviewed the recent literature dealing with the heat regulating mechanisms of the body. The fact that his bibliography comprises 222 items gives an idea of the extent of his reading. The fact that the text itself is consistently clear and interesting is a tribute to his ability to us the English language. Summaries of specific topics such as this are very helpful in bringing up to date those who lack the time or opportunity to continue the extensive reading which they did in their student days. Corrective Therapists will find the section dealing with fever and the various references to physical activity scattered through the book of especial interest. Recent experimental work quoted by Selle suggests that it will be necessary to alter such traditional ideas as those regarding the Northerners' reduced efficiency in the tropics and the need for the gradual rewarming of men suffering from exposure to the cold. A brief index is provided. It would be helpful to students if the titles of the articles referred to were given in the bibliography instead of only the name of the author and the publication reference.

PJR

SCIENCE AND MAN'S BEHAVIOR, by Trigant Burrow, New York: Philosophical Library, 1953, 564 pp. $6.00.

Introducing his book on dianetics, L. Ron Hubbard modestly claims that after the invention of fire, Dianetics was the most important discovery by man. Trigant Burrow's book, "Science and Man's Behavior," consists chiefly of a series of introductions making similar claims. The title of the book is promising; unfortunately, it turns out to be not science, but science fiction. This is so much more disappointing since it was written not by a layman but by the founder and a former President of the American Psycho-Analytic Association. The book is a scramble of neologisms, using such terms as "phyle analysis" and "contention." Contention appears to be the ideal attitude after freeing one's self of neurotic traits, equivalent to the dianetic "clear". The "phylobiological research" consists of measuring vital functions such as blood pressure and certain behavior patterns with relation to the eyes in contention. Phylobiology touches on ideas relating to group psychotherapy and semantics, but these subjects were all discussed more lucidly by other authors. The first 100 pages contain an exchange of views with 29 outstanding men of science to whom Burrow sent the manuscript of "The Neurosis of Man," which is the nucleus of this book. In reviewing the replies of these scholars, it appears that many express only bewilderment and confusion. Dr. Burrow had outlined "Science and Man's Behavior" and drafted the key chapters, but was unable to bring the project to completion. The book was published posthumously, edited by William E. Galt, Ph. D., Research Associate of the Lifwynn Foundation, Westport, Connecticut. The manuscript should have been permitted to rest in peace.

Ernest Fantel, M.D.

A HANDBOOK FOR THE BLIND, by Juliet Bindt, New York: The MacMillan Company, 1952, 244 pp. $3.50.

New suggestions for assisting the physically handicapped to make a better adjustment are always a justifiable reason for the publication of a book. Recently, a number of texts have reached the market to help in the rehabilitation of the hemiplegic, multiple sclerotic, etc., but Juliet Bindt's book is described as "The first factual guide for the blind."

Mrs. Bindt, who has been blind since the age of thirteen, is a graduate of Scripps College and of the University of California in Social Welfare. She has made an extensive survey of the blind to accumulate helpful methods and techniques in their adjustment towards normal living. The purpose of the book is not to discuss the psychological problems of the blind, but how to cope with the " . . . situations and conditions of daily life."

The book is divided into two parts. The first section, *To the Blind,* includes information on how to dress, handle food, travel on the street and on public carriers, shop, garden, cook, etc. The second section, *To the Sighted,* offers suggestions to those people called upon to guide the blind.

This handbook is a valuable compilation of informative material devoted to the solution of the problem of the blind and their sighted associates.

HJB

(Continued from Page 58)

vidual, or a socially productive individual of our community. Thus the major activities perhaps are now revolved around teaching the patient functional demands for daily living including such important activities as self-care, ambulation, physical demands pertinent to the job situation to which the patient is expected to go.

Whether or not the therapist will use individual instruction or group exercise, therapy will be dependent upon the neurological and psychological condition of the patient. Usually, individual instruction is begun at first, but we cannot follow any hard or fast rule because the Corrective Therapist may find patients are assigned to him at all levels of illness or injury. It is well to point out that when group exercise therapy is given, that the treatment of the individual patient is paramount but that we put him in a group because group activity, when the patient is ready for it, can provide the greatest contribution to the physical, mental, social and economic rehabilitation of the neurological patient.

It is extremely important that the Corrective Therapist continually evaluate his efforts in the rehabilitation program. He must carefull document all activities indicating the progress which is being made and the reasons why or why not the anticipated progress is made. Such means as progress notes, record charts, interpreting the results of research activities are the media through which we can objectively document and appraise our efforts. The challenge is great. We have just begun to scratch the surface. There are many problems that still beset us. There are many avenues that we have not yet explored. The Corrective Therapist must be possessed with the necessary fortitude to meet the challenge.

A DOZEN DON'TS IN DEALING WITH THE BLIND

(From the Journal of Rehabilitation Dated Nov.-Dec. 1951)

Of unknown origin is the list of admonitions titled as above which is here reproduced from a publication of Pennsylvania's State Council for the Blind. Occupying little space, these pointed reminders nevertheless cover considerable territory. The Journal is glad to give them wider circulation, sorry the source cannot be named. Perhaps some reader will produce the desired information.....

1. DON'T treat the blind as though they are abnormal specimens of humanity. Never talk to a blind man as though he were deaf, and do not imagine that the mere possession of sight implies superior knowledge.
2. DON'T refer to blindness as an "affliction"; it is a handicap. Never express sympathy for a blind person in his hearing, for you don't please him any more than you would a cripple by discussing lameness in his presence; there are more practical outlets.
3. DON'T try to carry a blind person when he is entering a car or train, crossing a road, or going upstairs. He is not usually lame, and only needs to have his hand placed on a handle or rail. A touch on the arm is sufficient for leading. You need not help him to sit down once he knows the position of his chair.
4. DON'T tack when piloting him across a road, go straight across if possible; otherwise you may upset his reckoning or cause him to side-stumble on reaching the curb. Sound and touch are the blind man's "sight," so do not push him before you in strange places, in order to see where he is going; go first, his hand touching you, that he may "see" where you are going.
5. DON'T think that a blind guest is a serious responsibility, or that he will break up your home, or need someone to dress, bib and feed him! To leave him a candle and locate the looking-glass, are not infrequent errors.
6. DON'T address a blind man through an intermediary. For instance, don't ascertain if he takes sugar to tea, by inquiring of his wife or friend; his own mentality is usually capable of enlightening you on any such matter.
7. DON'T make unusual revisions in conversation, such as withdrawing the word "see" and substituting "heard". Use the word "blind" without hesitation, if you are discussing "blindness" with those so handicapped, but don't substitute that topic for the weather.
8. DON'T fail to speak, if only a word, on entering a room in which there is a blind person; it announces your presence, and helps identification. Say who you are, if a stranger. Always shake hands when meeting or leaving a blind friend; for a handshake is as expressive as the face, and is the substitute for the smile of friendship.
9. DON'T take it for granted that every blind person is a musician or an idiot. Refrain from continually exclaiming "wonderful" or "marvelous" because he can do quite usual things, such as—tell time by his watch, fill and light his pipe, or discover that it has gone out.
10. DON'T talk of an "extra sense" or "providential compensations" and so perpetuate an obstinate delusion. The so-called "miraculous" is only extra development.
11. DON'T limit your knowledge and interest in the blind generally, to the street mendicant, who is frequently a social parasite from choice.
12. DON'T be patronizing with the blind, always be natural, and never fail in real kindness, for "you never know, you know".!

Chapter Activities

SOUTHERN CALIFORNIA CHAPTER

Minutes of the Regular Business Meeting of January 6, 1954.

President Burr Zachary called the meeting to order and asked for the secretary's reports, which were read by Mr. Howard Leitman in the absence of Mr. Murray Levitta, and approved as read. Mr. Bernard Weber read the treasurer's report and it also was accepted as read.

The Nomination Committee, Chaired by Mr. Phil Rasch, presented a slate of members in nomination which were elected to office by a unanimous vote by the members present. The new officers are: President, Mr. Rudy Jahn from Long Beach VAH; Vice President, Mr. Bernard Weber of Wadsworth VAH; Secretary, Mr. Richard Barr of Long Beach VAH; Treasurer, Mr. Hamilton Stephens of Brentwood VAH; Receptionist, Mr. Joe Tosches of Brentwood VAH. Rudy Jahn accepted the chair from Burr Zachary and gave forth with an acceptance speech in which he outlined his policies for the new year. He also selected Mr. Weber to chair the Program Committee, Mr. Barr to chair the Membership Committee and Mr. Stephens to chair the Budget Committee.

Through discussion and vote, it was decided to hold the business meetings on the first Thursday in alternate months starting in January and to start them at 7:00 PM.

It was voted to start a news letter at local chapter level and Mr. Weber was selected to head the news staff and publish a news letter with the first issue to be mailed in February to all members.

The local chapter dues were increased to three dollars by the vote of the members present.

The meeting was adjourned by the president at 8:30 PM.
(Next regular meeting set for March 4, 1954 at Long Beach.)

The Program Meeting of February 4, 1954.

Under the chairmanship of Mr. William Koos, Wadsworth CT, a very interesting and informative discussion was presented by Dr. Lawrence Morehouse and Dr. John Cooper of the Physical Education Department at USC. They chose as their topic "The Kinesiological and Physiological Problems in Relation to Cerebral Palsy Children."

Dr. Cooper led off the discussion with a paper concerning the problem of lifting and caring the patient as related to possible back injuries to the people lifting the patients. He illustrated his talk with demonstrations of different lifting procedures to be used. These procedures were arrived at through a long period of endeavor in the field where the problems exist. The results of this study were published in two booklets under the title "Carrying and Lifting of the Cerebral Palsy Child."

Dr. Morehouse concluded the program by discussing some of the physiological problems encountered that were not completely answered by their work and he suggested further research into several fields that might shed some light on the rehabilitation of the Cerebral Palsy Child.

About fifty members and interested persons were in attendance at the meeting held on the grounds of the VA Center.

SOUTHEASTERN CHAPTER

Tentative dates have been set for the annual meeting of the Southeastern Chapter of the Association. It is announced to be 8th and 9th of October at Murfreesboro, Tennessee. Les Burrowes, Secretary-Treasurer, is reminding all members that annual dues are also payable at this time.

News and Comments

MEDICAL RESEARCH FACES NEW CHALLENGE

With the development of a new vaccine for polio, scientific man has fought his way to the crest of the ridge in his war on infectious diseases. Medical research is now in a position to launch a new campaign against the disabling and crippling ailments such as heart disease, cancer, mental illness, and rheumatism.

"These illnesses blight the lives of millions and their families," declares Gilbert Cant in a provocative new twenty-five cent pamphlet "MEDICAL RESEARCH MAY SAVE YOUR LIFE!" published today by the Public Affairs Committee, 22 East 38th Street, New York.

"It is impossible to estimate, let alone overestimate, how much it will mean to humanity when medical science succeeds in banishing such terms as 'cardiac cripple', 'cancer victim', and 'mental patient' from our everyday speech and relegating them to the medical textbook alongside yellow fever and diptheria," Mr. Cant declares.

But "if we are to move at full speed against the human losses resulting from persistent, disabling illness," Mr. Cant estimates that we shall need to spend about $550,000,000 a year, or a cent a day for each American, for medical research instead of the meager one-third of a cent a day we now spend.

As an indication of what might be accomplished if sufficient resources were devoted to research against the chronic illnesses, Mr. Cant reminds us of the dramatic progress which has been made in the past fifteen years against the infectious diseases.

New discoveries such as the sulfa drugs, the antibiotics, isoniazid, and drugs for the control of malaria have been largely responsible for the spectacular 15 per cent reduction in the death rate for the United States between 1937 and 1952. In those years about 8.4 years were added to the span of life that Americans could look forward to.

In a number of specific diseases progress was even greater, Mr. Cant points out. "Since 1945, when streptomycin first appeared, through 1952, America's TB deaths have dropped 58 per cent. Now with isoniazid as well, the death rate should drop still faster. Isoniazid was a major factor in the dramatic 23 per cent drop in the TB death rate in New York City in the first part of 1953.

"Similar victories are already on record against most of the other infectious diseases," Mr. Cant adds. "In about five years after penicillin became generally available, the death rate from pneumonia and influenza was slashed by 47 per cent . . . In 1944-1952, death from appendicitis declined by 69 per cent, and from syphilis by 56 per cent."

"Just as experience has shown that many illnesses and deaths once considered inevitable can be mitigated or postponed by modern medical knowledge, so it is reasonable to believe," Mr. Cant declares, "that the process can be continued."

But he warns that much remains to be done. There is a shortage of trained research workers. Until very recently, most medical research was on a hit-or-miss basis and was starved for funds. Although the situation has improved considerably, medical researchers could make use of twice the $180,000,000 now spent by the end of one year and three times this amount within a few years.

COLLECTION OF SPORT AND HEALTH LECTURES AVAILABLE

This is a collection of fifty lectures from the International Conference on Sport and Health held in Oslo, Norway, in connection with the Olympic Winter Games in 1952. This is a collection of papers given by internationally famous authorities in this field, and is a classic of its type.

This little book is not for sale, but will be distributed free as long as the copies last. Those wishing to secure the book should address Dr. Otto Johansen, State Officer for Sport and Youth Work, The Royal Norwegian Ministry of Education, Olso, Norway.

SIDNEY L. TOABE REPORTS ON GROUP TREATMENT BY REMEDIAL GYMNASTS OF GREAT BRITAIN

(Editor's Note: Sidney writes: "I hope I have put over the fact that Rehabilitation is an established fact in this country and practically every orthopedic surgeon believes that exercise is an essential part of fracture treatment. In Vol. 8, No. 1, JAPMR a review of the educational qualifications of Remedial Gymnasts was presented. In this report the classification of patients for group activity presents a pattern adaptable to Corrective Therapy programs and helps free beds in our overcrowded hospitals with benefit to both patients and management still facing an acute shortabe of corrective therapists.)

It is really remarkable how active physical medicine treatment has taken a firm foothold in the British Medical Services. In the hospitals and rehabilitation units, I have visited or worked in so far, practically every medical and surgical patient is receiving therapy in some form. Such a full program naturally necessitates, in some instances, a group approach to treatment.

Of course group treatment in physical medicine is not a new concept. It was used extensively in the British and American armies during World War II. However in Great Britain its war time objectives have been adapted to civilian use. Fitness for work instead of fitness to fight is now the prime objective.

I think that an outstanding example of the successful application of this approach can be found at the Bridge of Earn Fitness Centre, Perthshire, Scotland. The Fitness Centre itself has been in operation since 1943. It was originally established at the request of the Ministry of Fuel and Power and the Miners Welfare Commission for the purpose of providing rehabilitation services for miners. Since then its scope has been extended to include a wider range of patients. The Centre's program was first developed by the late Dr. P. J. McCloed and is now beind directed by Dr. H. A. Graham.

The majority of patients at the Fitness Centre are men with jobs in coal mines, heavy industry, agriculture and on the docks. In other words, they are men who do hard work and they must be ready to go back to it when they leave the Centre. Only patients who are abulatory are admitted for treatment. Although there is a wide range of incapacities, the majority of the accident cases are as a result of various types of fractures or joint injuries.

Patients are usually admitted to the Centre from hospitals where they have received medical or surgical and preliminary physical medicine treatment. On arrival, the patient is examined by a physiatrist who prescribes his treatment program. The program generally consists of a full day schedule which would include one class of General Physical Training; one class of Games; two classes in Remedial Exercises; and two classes in Occupational Therapy.

There are six primary groups of medical and surgical conditions in which a patient may be classified. They are as follows: I Chest (ex. Emphysema, Arrested T.B., Bronchitis etc.) II Trunks (Fractured spines, Possible disc's, low back pain, etc.) III Legs (knee injuries and fractures above knee). IV Feet (Fractures below the knee and foot injuries). V Hands, Arms and Shoulders (Fractures and Dislocations). VI "Specials" (Neurological, Arthritics, Cardiacs, Abdominal Surgery, Amputees, etc.)

The Remedial Exercise, General Physical Training and Games classes for the Trunk and Leg groups are sub-divided into three grades to show progression. All the tables of remedial and physical training exercises are adapted to the specific conditions. Their grading is also based upon such criteria as body position (for exercise), strength, endurance and flexibility.

Therefore a patient, admitted as a Trunk case, will follow a program of exercise and activity specially planned for his group's disability but also arranged on an individual basis dependent upon such variables as the patients age, his diagnosis, his prognosis, other complicating factors etc. Each week all of the 160 patients in the Centre have their cases reviewed by the Physiatrist and the chiefs of Remedial Gymnastics and Occupational Therapy. They evaluate progress; change a patient's grade; or decide that he is ready to go back to work. The patient also has an opportunity to express his views at this time. The average length of stay in the Centre is about six weeks but no patient is discharged until it is felt that he has received the maximum benefits from treatment.

GENERAL COMMENTS:

I have presented only a broad view of the work going on at the Bridge of Earn Fitness Centre. Such a program, on a more limited scale, is being carried out in many hospitals and rehabilitation units in Great Britain. However this particular centre was the first residential unit of its kind and it has a long record of achievement in Industrial Rehabilitation.

Many readers will seriously doubt the motivational value of Games, General Physical Training, and Remedial Exercise Classes in the treatment of adult patients ages twenty to seventy. However group treatment is in a sense synonymous with "team spirit". The Remedial Gymnasts, at this Centre, have the leadership qualities to inspire confidence in the patients so that they believe in the cumulative value of their treatment. These leadership qualities of the Remedial Gymnasts are well demonstrated in the fact that the classes can practically run by themselves when not under close supervision. This leaves adequate time for the therapist to pay close attention to the individual needs of each member of the class. I, myself, took part in the class work both as a "patient" and then as an instructor. In each case, I could sense the feeling of cooperation and interest within the class.

Of course one has to expect a certain number of patients who will not receive maximum benefit from class therapeutics. It may be due to the various implications in the diagnosis of their condition or there may be certain psychological problems. I think that you have to expect the normal deviation from the mean in human relations. An interesting point brought up by the Medical Director of the Centre, was that in his experience only one patient has refused to follow through with the treatment program.

As for the problem of men of different ages working together in classes. I think that the common denominator is represented by the fact that almost all of the patients had been previously conditioned to doing hard work. In none of the hospitals where I have been was this question thought to be a complex one. Most therapists felt that close supervision in class treatment would be able to allow for individual differences in age.

I realize that I have only scratched the surface on this subject of group treatment. Here in Britain, it represents the base upon which medically prescribed reconditioning programs have been developed for injured workers. Because of these programs, recovery time from accidents has been markedly reduced. No longer does the patient have to spend his convalescent time sitting at home waiting "to feel well enough" to go back to a full days work.

TEACHERS COLLEGE, COLUMBIA UNIVERSITY SUMMER SESSION PROGRAM

A diversification of training opportunities for teachers and other professional workers with exceptional children characterizes the 1954 Summer Session Program in Special Education offered by Teachers College, Columbia University. Professional preparation leading to advanced degrees will be offered in the following areas: The Mentally Retarded, the Physically Handicapped, the Deaf and Hard of Hearing, and Audiology.

Students preparing for work with the physically handicapped will have opportunities to select courses from the following offerings: Psychology of the Physically Handicapped, Health Problems of Physically Handicapped Children, Education and Care of the Physically Handicapped, Education and Care of the Cerebral Palsied Child, and Techniques for Functional Living with Physical Disabilities.

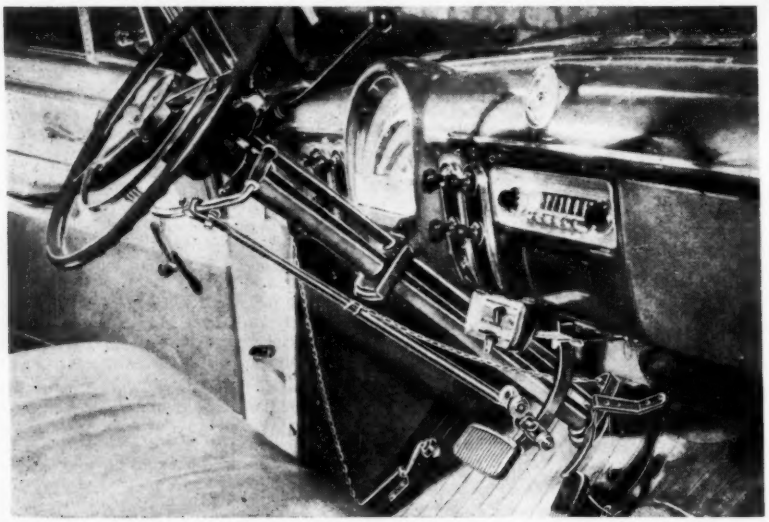
The regular six week summer session will be supplemented by two Workshops to be given in June, 1954. The Field Workshop in Rehabilitation Training offered in cooperation with the Institute for the Crippled and Disabled and the New York School of Social Work will provide for participation in a rehabilitation center program coupled with lectures, demonstrations, team meetings, case conferences, and visitations. A limited number of advanced students and rehabilitation workers will receive intensive practice under skilled supervision.

Further information about all or part of the Summer Session program in Special Education at Teachers College may be obtained by writing to Professor M. H. Fouracre, Chairman, Department of Special Education, Teachers College, Columbia University, New York 27, New York.

Ours Will Operate A Standard Shift With Only One Lever

ARNOLD—HAND CONTROLS

All Arnold Controls Give A Car-Life Guarantee



Easily Installed By Any Mechanic By Using Pictured Instructions—Pencil-Like Lever (Pull-to-Go—Push-To-Stop) Operates Entire Car.

Arnold DEVICES, INC.

310 East 34 Street — New York 16, N. Y.
Opp. Queens Midtown Tunnel — LExington 2-5989—6294
WHEEL CHAIRS—HOSPITAL EQUIPMENT SALES & SERVICE—AMBULANCE AND OXYGEN SERVICE
RAvenswood 9-3398

Association for Physical and Mental Rehabilitation

MEMBERSHIP APPLICATION

Mail to Leslie Root, 2142 N. 61st St. Wauwatosa, Wisconsin

Enclosed please find (check one)
___$10.00 for my Active Membership
___$ 5.00 for my Professional Membership
___$ 4.00 for my Associate Membership

Name.....Date.....
(Print or Type)

Home Address.....
(Street) (City) (State)

Signature.....

Proposed by.....Address.....

Active

Position Title.....Location.....

Education.....
(College) (Major) (Degrees)
(Degree with major in Physical Education required)

Training and/or experience in Physical and/or Medical Rehabilitation includes:
(One year under the direct supervision of a Medical Doctor required)

.....

.....

Professional

I received my.....degree or certificate from.....
(cross out one) (name of college, university, institution)

I am.....Location.....
(List your profession related to rehabilitatinn, such as physician, nurse, clinical psychologist, speech therapist, physical educator, sports technician, social worker, vocational advisor, etc.)

I have a special interest in rehabilitation because.....

.....

Associate

I am employed at.....
(list your position) (location)

I have a special interest in rehabilitation because.....

another Everest & Jennings first...

Model 8U 20-76-15

footrests that adapt to patient's needs

footrests swing around to the side or can be completely detached

This Everest & Jennings chair offers new convenience in daily living. Its swinging, detachable footrests simplify getting in and out of the chair and enable a closer approach to bed, car and other objects where immovable footrests have made difficulties. There is new freedom for light exercise of feet and legs. And with footrests removed, chair is easier to fold and put in car. When suggesting this chair, specify Model 8U 20-76-15.

EVEREST & JENNINGS, INC.

761 N. Highland Ave., Los Angeles 38, Calif.

Classified Directory

Price of Directory Listing for one year—6 issues—$10.00

STORES WHERE EVEREST AND JENNINGS PRODUCTS MAY BE PURCHASED

BOWERS AMBULANCE SERVICE, 430 E. Pacific Coast Highway, Long Beach, *California*
MATTHAYS, 809 S. Hill St., Los Angeles 14, *California* — TR 5849
YALE SURGICAL CO., 1004 Grand Ave., New Haven 11, *Connecticut*
CHICAGO WHEEL CHAIR CO., 1071 W. Ogden Ave., Chicago 12, *Illinois* — SE 8-1111
V. MUELLER & CO., 320 S. Honore St., Chicago 12, *Illinois* — SE 3-2180
AKRON SURGICAL HOUSE, INC., 217-223 N. Pennsylvania St., Indianapolis 4, *Indiana* — LI 1506
REGER RENTAL, SALES & SERVICE, Box 284. 717 N. Main, Hutchison, *Kansas* — 2-2375
SALINA SURGICAL APPLIANCE STORE, 116 S. 5th St., Salina, *Kansas* — 9715
PEACOCK SURGICAL CO., INC., 1235 Texas Ave., Shreveport, *Louisiana* — Day 3-5276—Night 7-4910
THE COLSON-MERRIAM CO., 1623 N. Aisquith St., Baltimore, *Maryland* — Mulberry 2847
MEDICAL ARTS SURGICAL SUPPLY CO., 20-22-24 Sheldon Ave., S. E., Grand Rapids 2, *Michigan*
C. F. ANDERSON, INC., Surgical and Hospital Equipment, 901 Marquette Ave., Minneapolis 2, *Minnesota*
PHYSICIANS & HOSPITALS SUPPLY CO., INC., 1400 Harmon Place, Minneapolis 3, *Minnesota*
HARRINGTON SURGICAL SUPPLY, 218 N. Main St., Butte, *Montana* — 6542
SEILER SURGICAL CO., INC., 111 S. 17th St., Omaha 2, *Nebraska* — ATlantic 5825
AMSTERDAM BROTHERS, 1060 Broad St., Newark 2, *New Jersey*
BELLEVUE SURGICAL SUPPLY CO., 52-54 Garden St., Passaic, *New Jersey*
BURLINGTON SURGICAL APPLIANCES, 314 High St., Burlington, *New Jersey* — Burlington 3-0052
COSMEVO SURGICAL SUPPLY CO., 236 River St., Hackensack, *New Jersey* — DIamond 3-5555
ELMIRA DRUG & CHEMICAL CO., 157 Baldwin St., Elmira, *New York* — 6289
DOWD CHAIR RENTAL & SALES, 392 Franklin St., Buffalo, *New York* — Cleveland 3335
DOWD CHAIR RENTAL & SALES, 138 South Highland Ave., Pittsburgh 6, *Pennsylvania* — Montrose 1-5355
DOWD CHAIR RENTAL & SALES, 4848 Woodward Ave., Detroit 1, *Michigan* — Temple 3-3490
DOWD CHAIR RENTAL & SALES, 2245 Biscayne Blvd., Miami 37, *Florida* — 2-2152
DOWD CHAIR RENTAL & SALES, (Canada) LTD., 589 Yonge St., Toronto 5, Ontario, *Canada* — Princess 6644
HOLMES, AMBULANCE & OXYGEN SERVICE, 486 Flatbush Ave., Brooklyn 25, *New York*
MAYFLOWER SURGICAL SUPPLY CO., 2515 86th St., Brooklyn, *New York*
NASSAU SURGICAL APPLIANCE CO., Manufacturers and Fitters of Artificial Limbs and Braces, 362 Fulton Ave., Hempstead, *New York* 2-3460
JEFFREY-FELL CO., 1700 Main St., Buffalo 9, *New York* — Garfield 1700
MAYFLOWER SURGICAL SUPPLY CO., 212 Front St., Mineola, L. I., *New York* — Garden City 3-5280
SOCIAL SURGICAL APPLIANCE CENTER, 838 Broadway, New York 3, *New York* — ALgonquin 4-3509
FIDELITY MEDICAL SUPPLY CO., 1st & St. Clair Sts., Dayton 2, Ohio — MI 7636
THE CLEVELAND ORTHOPEDIC CO., 5904 Euclid Ave., Cleveland 3, *Ohio* — HE 1-8484
GRANT G. FORSYTHE, 11 E. 6th St., Tulsa 3, *Oklahoma*
SHAW SURGICAL CO., 902-912 S. W. Yamhill St., Portland 7, *Oregon* — BR 3456
E. A. WARNICK CO., Simon Long Bldg., 50-52 S. Main St., Wilkes-Barre, *Pennsylvania* — 2-8064
HEYL PHYSICIANS SUPPLY CO., 419 State St., Erie, *Pennsylvania* — 2-6785
POWERS & ANDERSON, INC., 2-4 South 5th St., Richmond 2, *Virginia* — 2-6589
HORNE ORTHOPEDIC APPLIANCE CO., 8 W. Poplar, Walla Walla, *Washington* — 5152
HOSPITAL AMBULANCE, OXYGEN & EQUIPMENT CO., INC., 1823 'L' St., N. W., *Washington 6, D. C.* — ME 3900
THE COLSON-MERRIAM CO., 703 Transportation Bldg., *Washington 6, D. C.* — National 0011
HOUSE OF BIDWELL, INC., 604 N. Water St., Milwaukee 2, *Wisconsin* — BR 2-4369

STORES WHERE EVEREST AND JENNINGS PRODUCTS MAY BE RENTED OR PURCHASED

ABBEY RENTS, 600 S. Normandie Ave., Los Angeles 5, *California* — AN—1-6134; NE—8-4135; DU—4-5292; PL—2-3131 OR—7-6178; CI—3-2101; ST—4-1174; CR—1-2103; SY—6-9293; EX—4-3232
ABBEY RENTS, 2841 S. El Camino Real, San Mateo, *California* — FI—5-5775
ABBEY RENTS, 1827 "J" Street, Sacramento 14, *California* — HU—4-9151
ABBEY RENTS, 1761 American Ave., Long Beach, *California* — LB—6-6264
ABBEY RENTS, 2895 El Cajon Blvd., San Diego, *California* — Atwater 1-8151
ABBEY RENTS, 1314 Post Street, San Francisco, *California* — GR—4-2525
ABBEY RENTS, 2315 Broadway, Oakland, *California* — HI-4-8181
ABBEY RENTS, 350 Broadway, Denver, *Colorado* — Pearl 3-4651
ABBEY RENTS, 310 S. Ninth St., Minneapolis 2, *Minnesota* — Lincoln 8931 (Mpls.) Nestor 8831
ABBEY RENTS, 4041 Broadway, Kansas City, *Missouri* — Jefferson 5200
ACME-ABBEY RENTS, 3230 Washington Blvd., St. Louis 3, *Missouri* — Olive 2-5700
ABBEY RENTS, 1000 E. Burnside, Portland, *Oregon* — Filmore 5001
SAM FORTAS HOUSE FURNISHING CO., INC., Main and Poplar, *Memphis, Tenn.* — 5-3515
BEST RENTALS, 2025 S. Shepherd Drive, Houston 2, *Texas* — Keystone 4416
ABBEY RENTS, 1000 Pike Street, Seattle, *Washington* — Seneca 5040
ABBEY RENTS, 2824 W. Fond du Lac Ave., Milwaukee 10, *Wisconsin* — Uptown 3-2000

MANUFACTURERS OF ORTHOPEDIC AND PROSTHETIC APPLIANCES

BIRMINGHAM ARTIFICIAL LIMB CO., 410 N. 19th St., Birmingham 3, *Alabama* — 3-1786
ALEXANDER ORTHOPEDIC CO., INC., 301 Shipley St., Wilmington, *Delaware*
UNITED LIMB AND BRACE CO., INC., 61 Hanover St., Boston 13, *Massachusetts* — Capitol 7-2183
JACKSON BRACE & LIMB CO., 1224 N. State St., Jackson, *Mississippi*
NATIONAL LIMBS INC., 3137 Farnam, Omaha, *Nebraska* — WE-4088
UNITED ORTHOPEDIC APPLIANCE CO., 791 Broadway, New York, *New York*

W. T. Hinnant Artificial Limb Co., 120 E. Kingston Ave., Charlotte, *North Carolina*
Fidelity Orthopedic, 5th and Main Sts., Dayton 2, *Ohio*
W. F. LaForsch, Orthopedic Appliances, 536 Valley St., Dayton 4, *Ohio* ..... FU 5462
George S. Anderssen Co., 3419 Walnut St., Philadelphia 4, *Pennsylvania*
Modern Limb & Brace Co., 1133 S. 19th St., Harrisburg, *Pennsylvania*
Snell's Artifical Limb Co., 1916 West End Ave., Nashville 4, *Tennessee*
Snell's Artificial Limb Co., Johnson City, *Tennessee*
Snell's Artificial Limb Co., 240 Madison Ave., Memphis, *Tennessee*
The Fit-Well Artificial Limb Co., 125 W. 3rd St., South, Salt Lake City 1, *Utah* 4-6741
Herman J. Geisler, Facilities for the Handicapped, 390 Cedar St., Fond du Lac, *Wisconsin* 989

UNCLASSIFIED

The Vaso-Pneumatic, Mfgd. by Poor & Logan Mfg. Co., 7319 Varna Ave., North Hollywood, *California*
Hurl-O-Dart Manufacturing Co., "The Ideal Lawn or Beach Game," 2242 Union St., Indianapolis 2, *Indiana* ..... GA 2242
Paravox Hearing Aids, Elm Creek, *Nebraska* 2231
Hausted Manufacturing Co., Hospital Equipment, Medina, *Ohio* 3-1803
The Liebel-Flarsheim Co., Manufacturers of Apparatus for Physical Medicine, Cincinnati 15, *Ohio* ..... PO 2700
Invalid Chair Co., 2124 N. 45th St., Milwaukee, Wisconsin ..... HI 4-7756
National Sports Equipment Co., 360-370 N. Marquette St., Fond du Lac, *Wisconsin*
Can-Pro Corporation, Insulated Containers, 19, 23, 31 East McWilliams St., Fond du Lac, *Wisconsin*

HOYER LIFTER

A Safe, Dependable Patient Lift

See your Everest and Jennings dealer or write to manufacturer.

Ted Hoyer & Company
OSHKOSH, WISCONSIN

DOORWAY GYM BAR

SECTIONAL VIEW OF THE DOORWAY GYM BAR

Instantly installed in doorway by expansion. No nails or screws. Exercises included. Very highly recommended by physical educators.

Write for particulars to

OLYMPIAN INDUSTRIES
4720 N. Kilpatrick Ave., Chicago 30, Ill.

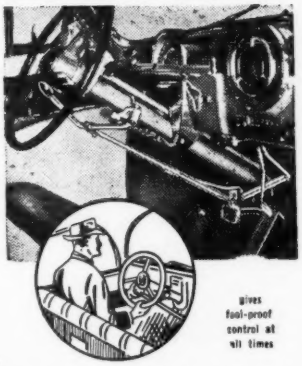
PATRONIZE YOUR ADVERTISERS

They supply dependable equipment

Handicapped Drivers!

DRIVE YOUR CAR

—SAFELY
—EASILY
with new Mechanical
GAS & BRAKE
HAND
CONTROLS
$39.50
Plus postage with copy of this ad
KIT CAN BE INSTALLED IN 2 HOURS



gives fool-proof control at all times

Here's the greatest development in handicapped driver controls. One lever does both operations—works both brake and gas—makes your car absolutely fool-proof. The slightest touch of your fingers now operates your car! Thirty years' experience in building automatic clutch and brake controls have gone into this new development.

CALL or WRITE for FREE PAMPHLET
—be convinced!

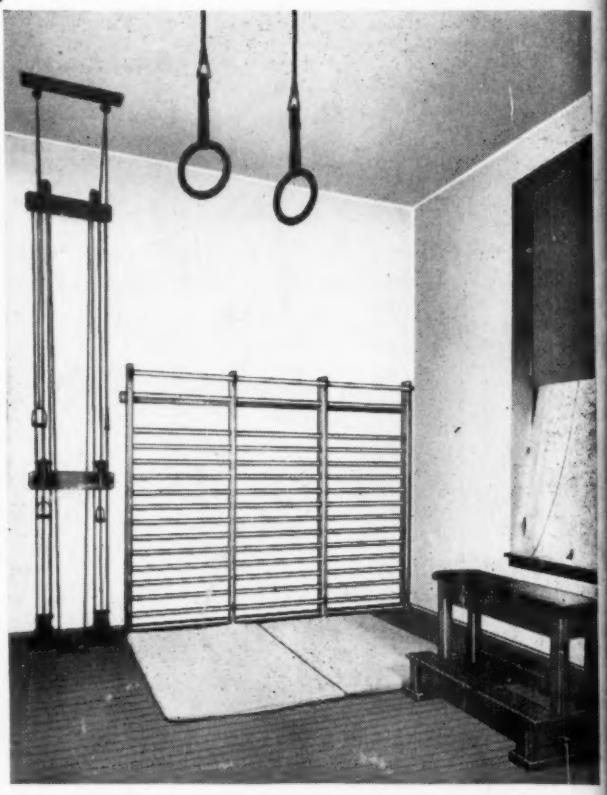
BRAKES INC.
Long Island's largest brake specialists

3716 QUEENS BLVD.
LONG ISLAND CITY
NEW YORK
STillwell 4-6417

If not delivered in 5 days
return to
Stanley H. Wertz
1433 Railton Road
Memphis, Tennessee

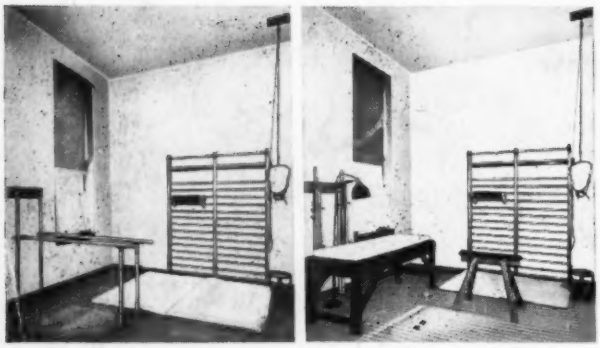
State Univers t:es of Iowa
Libraries
Serials Acquisitions
Iowa City, Iowa

SEC. 34.66 P. L. & R.
U. S. POSTAGE
PAID
MEMPHIS, TENN.
PERMIT NO. 143



APPARATUS FOR

Corrective Therapy



Views above and left show well-equipped rooms in the physical therapy department of Michael Reese Hospital, Chicago. Porter supplies stall bars, gym mats, chest weights and a wide variety of highly specialized corrective devices described in a catalog which is yours for the asking.

Porter Corrective Therapy Apparatus is carefully manufactured from designs based on the recommendations and experiences of authorities in the field. Many of the devices are standard equipment in Physical Medicine Rehabilitation and Corrective Gymnastic work.

A catalog containing these standard items will be mailed on request. For therapists requiring special devices, Porter's engineering department is available for working out new designs to meet new requirements.

Backed by nearly a century of quality manufacturing, The J. E. Porter Corporation is the world's largest makers of gymnasium, playground and swimming pool equipment. The same reputation that has made Porter a famous name among schools, universities and recreation leaders is your assurance in the choice of Porter as a source for dependable Corrective Therapy Apparatus.

Send for your free copy of the Porter catalog of Physio-Therapy Apparatus, sent without obligation on request.

THE J. E. PORTER CORPORATION

FACTORY AT OTTAWA, ILLINOIS

CHICAGO OFFICE: 664 N. Michigan Avenue, Chicago 11, Phone: SUperior 7-7262
NEW YORK OFFICE: 11 West 42nd Street, New York 18, Phone: LOngacre 3-1342

R.
C

N.
S